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URETERAL CALCULUS.[1]

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STONE in the ureter may present a problem that will test the skill of the surgeon in diagnosis, his manipulative ability in cystoscopic manœuvres and his judgement in assessing the indications for operative measures.

The great majority of ureteral stones are undoubtedly formed in the kidney and frequently only give symptoms on their passage down or their impaction in the ureter. The clinical picture is one of colic, with varying degrees of obstruction. The condition is generally one of middle life, about two-thirds of the calculi occurring in persons aged between twenty and fifty years. Ureteral calculi occur about twice as frequently in males as in females, and about equally on either side.

As in the kidney, when infection is not a feature, the majority of calculi consist of calcium oxalate, and when infection is present, of phosphates. Uric acid stones are not common, but when they do occur they can, by their transparency to X rays, make diagnosis a difficult matter.

The variation in the calibre of the ureter, together with the occlusive effect of the obliquity of the lower pelvic segment approaching and traversing the bladder wall, provides an explanation of the site of impaction. About 70% of stones are held up in the pelvic segment.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on April 28, 1938.

Symptoms.

Most stones make their presence felt while in the ureter. The symptoms may vary from a mild discomfort or ache to an acute crisis, paralleled in its intensity by renal or gall-bladder colic. Hæmaturia is not uncommon, vomiting and nausea are often present, and in the presence of infection fever is a feature. Renal pain or even colic from back pressure may occur, while the radiation of pain may be to the groin, testicle, vulva, or front of the thigh. Other conditions causing renal or ureteral obstruction, such as kinks and the passage of clots, will cause the same symptoms. In many cases renal is at first indistinguishable from ureteral colic, while in others the lower situation of the initial pain followed by kidney discomfort of varying degree is diagnostic.

Bladder symptoms, such as frequency of micturition and terminal pain, are often present when the stone is impacted low in the ureter.

The diagnosis of ureteral stone in the face of vomiting, distension, muscular rigidity and constipation may be extremely difficult; and many appendices have been removed on account of symptoms suggestive of an intraperitoneal lesion. Red blood cells in the urine are very constant when the colic is ureteral and very rare in cases of appendicitis.

Examination.

An X ray examination should be carried out in every case. Unfortunately, most stones and most phleboliths are found in the pelvic region, and often a distinction can be made only by means of an X ray film after the passage of an opaque ureteral catheter. An excretion urogram may be diagnostic, but can also be inconclusive. If an X ray film shows a solitary shadow about the line of the ureter and if the kidney is functioning at the time, diagnostic information is generally obtained. If a number of shadows are seen when a plain skiagram is made, and if these are grouped about the uretero-vesical region, even if the bladder is emptied immediately prior to the taking of the picture, in excretion urography, doubt may exist.

Cystoscopy is of much more positive assistance. The appearance of the orifice of the ureter under suspicion may be diagnostic. The characteristic ring of bullous œdema about the site of the opening of the ureter, with or without a stone projecting, makes a very striking picture. If the stone is in the intramural part, often a tumour may be seen behind the orifice. When the stone is higher, it may be impossible or difficult to pass the catheter beyond a constant fixed point. A skiagram made then showing a small shadow perched on the tip of the catheter makes diagnosis certain.

A decision is, however, difficult in many cases in which a history of ureteral colic can be elicited.

Patients are frequently referred for investigation after what appears to have been typical colic, often with hæmaturia, whose skiagrams show no shadow, who present no characteristic appearance of a stone having been passed on cystoscopy, and who give no history of having passed a stone. Renal function may be equal and normal. When no shadow is present, and whether the function of the kidney is normal or deficient, I believe the most useful measure to be the passage of a catheter with a wax bulb about the terminal opening. Equal parts of soft paraffin and beeswax make a suitable bulb. A stone largely composed of uric acid may be the cause of the trouble, and characteristic scratches easily discernible by a hand lens are of great diagnostic significance. A filling defect in the ureterogram will confirm the diagnosis. It is unwise to inject much sodium iodide in the case of a suspected stone, as any addition to the contents of the already tense ureter and pelvis will increase the patient's discomfort.

A. Ravich reviewed 758 cases of his own; the X ray picture was diagnostic in about 90%, and in most of the remainder diagnosis was made by means of the wax-tip catheter.

I can recall carrying out pyelography for a renal or ureteral colic, finding a low kidney and being satisfied that that was the trouble. I performed nephropexy, and the patient passed a small uric acid stone the week he left hospital. Subsequent examination of the X ray plates revealed nothing suggesting a calculus.

In the majority of these cases a full investigation, including an examination of the urine for uric acid or oxalate crystals, reveals no abnormality. I presume a small stone has been passed unknown to the patient; and in the case of the young person with no bladder-neck obstruction, I can offer no other explanation.

I operated on one patient for a stone and found nothing; a ureteral colic had occurred, and the catheter was in the line of a calcareous gland. A lateral picture would have prevented this mistake.

Treatment.

It may be said that the surgeon who wishes to impress will lose no delay in suggesting some immediate treatment, even if it is only a dose of medicine in the surgery, for the reason that nearly half the ureteral stones can be passed without any outside help.

Treatment may be divided into (i) expectant treatment, (ii) cystoscopic manœuvres, (iii) operative treatment.

Expectant treatment is justified in most cases of ureteral calculus, and usually consists of greatly increasing the consumption of water. Morphine, with or without atropine, is given to relieve colic. Ockerblad and his co-workers investigated the effect of morphine on the human ureter and found that the usual clinical dose greatly increased ureteral tone and the amplitude of the contractions. Atropine in a dose of 0·00065 gramme (one one-hundredth of a grain) invariably eliminated the contractions of the morphine-stimulated ureter, with consequent loss of tone, but had little effect when given alone. I have found the intravenous administration of 10 cubic centimetres of 10% calcium gluconate solution to be of use both to relieve colic and to aid the passage of a stone. The

rationale is not clear, but calcium is thought to reduce the irritability of unstriped muscle. Expectant treatment is contraindicated in calculous anuria, and would appear to be inadvisable in the presence of a large stone or of much dilatation of the ureter above the site of impaction.

Cystoscopic manipulation is required in the majority of cases, but it is impossible to say in what percentage. In Ravich's series 83·6% were thus dealt with. I presume all his patients were referred, and his figures show that more than half had had repeated attacks of colic. Undoubtedly many patients pass their stone during the first and only ureteral crisis, and their condition subsequently would not warrant their being seen by a urologist.

The multiplicity of instruments suggested for the dislodgement of stones in the ureter is evidence of the ingenuity of workers in this field, but rather a criticism of the efficiency of any one method in achieving the objective. Most of the mechanical devices are to be condemned, as a large proportion of stones will pass after dilatation of the ureter and the employment of retention catheters.

A local anæsthetic may be injected about the stone through a ureteral catheter to relieve the spasm. Sterile liquid paraffin is worthy trying from the point of view of lubrication. When the stone is in the pelvic part of the ureter, dilatation either by bougies or by the multiple blade expanding device is often successful. If the impaction is intramural the anterior wall of the ureter may be slit by cystoscopic scissors or preferably by the cutting current, a copper wire passed through a catheter being used as the electrode.

The Howard spiral wire dislodger is a simple device and sometimes successful when the stone can be engaged. I have never seen the more heroic instruments used; and it may be a coincidence, but I have never seen a ureter perforated during a cystoscopic manœuvre.

The decision as to when conservative measures should be abandoned and ureterolithotomy carried out is not always easily made. As a generalization, I should say that when two, or at the outside three, attempts have been made and the stone is making no progress, operation should be undertaken. It must be remembered that the ureter is a delicate organ, and repeated trauma may ultimately result in more damage to it than a small incision. All surgeons who have performed the operation will readily recall cases in which the stone appeared to be almost a part of the ureteral wall, giving the impression that no amount of manipulation would be successful.

Probably less than 20% of patients with diagnosed ureteral stones come to operation. Some indications for operation would appear to be absolute; for example, the presence of a large stone impacted high up, calculous anuria, and dilatation of the ureter on the proximal side so that no catheter can be passed beyond the stone.

Thompson has stressed the point that if a catheter is passed alongside the stone it should not be removed until ureterolithotomy is performed, to reduce the risk of renal infection and tension damage.

I would emphasize strongly one point in technique prior to every operation for ureteral stone, and that is that the patient should be accompanied to the theatre by a wet X ray film confirming the presence and the site of the calculus. Patients will pass stones themselves in spite of our wish to be of assistance, and it is often difficult enough to find a small stone when we are positive of its presence and location, without having to hunt for one that was passed during the attack of colic prior to admission.

I propose to discuss briefly ureterolithotomy, and to omit the cases in which nephrectomy is indicated on account of the permanent damage that has resulted from the impaction of a calculus in the ureter.

Joly has stated that when the kidney is removed the remaining calculous ureter causes trouble in only 2% to 5% of cases.

All operations should be carried out extraperitoneally, as the urine is often infected and a sinus may exist for a day or two.

Operative Technique.

Lumbar Stones.—When situated high in the ureter the lumbar stone may be approached by any of the incisions used to expose the kidney, the best known of which is the curved incision of Mayo. I myself prefer a vertical incision along the lateral border of the *erector spinæ* muscle group, in which the only muscle fibres cut are a few of the *latissimus dorsi*. Generally speaking, operative procedures are carried out much earlier for stones impacted in the lumbar part of the ureter, as manipulations are less effective and the stone, recently passed from the kidney pelvis, is often larger than the average found in an otherwise healthy ureter. The ureter is, of course, incised longitudinally over or close to the stone. Every care should be taken that the latter is not allowed to escape up to the kidney; and probably the best measure is to pass a narrow strip of gauze round the ureter on the renal aspect. It appears immaterial whether the ureter is sutured or not, but I prefer to appose the cut edges by one or more sutures that pick up the coat, without penetrating to the lumen. The surgeon should never fail to pass a ureteral bougie or flexible probe up and down the ureter to make certain of its patency after removal of a stone. In all cases drainage should be carried out for a few days.

Iliac Stones.—Occasionally stones have to be sought about the pelvic brim. An oblique gridiron incision is very satisfactory if the surgeon has an exact knowledge of the location of the stone. The ureter is found adherent to the posterior aspect of the peritoneum.

Pelvic Stones.—Pelvic stones comprise the majority of impacted ureteral calculi. In general two incisions are available, the vertical mid-line and the oblique. Federoff and Jaroscheivitsch take the pelvic height measured from the ischial tuberosity

to the highest point on the iliac crest, and the width between the widest points of the crest. The ratio of height to width multiplied by 100 is the index of depth. In pelves with indices of 58 to 69 they advise the lateral approach, and in those with indices above 78 the median approach. In pelves with indices between 70 and 78 the routes offer equal facilities.

The median incision is from the pubis towards the umbilicus, the recti are separated, and by careful finger dissection the lateral wall of the pelvis is exposed by pushing the peritoneum upwards and medially. The ureter is closely adherent to the peritoneum. Frequently the stone is felt before the ureter is identified, but if any difficulty is experienced the ureter is constantly found crossing anterior to the bifurcation of the common iliac artery. Again, the surgeon must take every precaution to prevent retromigration of the stone.

The lateral approach is by an incision about 2·5 centimetres (one inch) above and parellel to the inguinal ligament. When the stone is close to the bladder the median incision gives a more ready approach than the lateral incision. Care must be taken that the peritoneum is stripped from the site of the proposed incision of the ureter; otherwise, if it is only folded away, the adherent edge may be buttonholed.

Vaginal ureterolithotomy has been revived lately. The diagrams and reports have been convincing, but in the only case in which I have considered the method the kidney was grossly damaged, and I carried out nephrectomy.

Complications and Sequelæ of Operation.

The stone may not be found at operation, and I have suggested the measures that should be adopted to make this possibility remote. Every care must be taken in isolating the pelvic part of the ureter that small veins draining into the iliac veins should not be torn; since, if the rupture occurs near the large vessel, hæmorrhage is very profuse and may render completion of the operation impossible.

I have had one case in which I failed to control the hæmorrhage from the cut ureter. The repaired area appeared dry at the time; yet not only did the loin, but also the bladder fill with blood clots. Blood transfusion and packing were necessary to save the patient.

A permanent fistula is very rare if there is no obstruction below the incision in the ureter; as I have said, that should always be tested for while the ureter is open. Obviously a healthy ureter will heal better than one that is dilated and infected, and in those cases in which an effort is being made to conserve a badly damaged kidney by removal of the ureteral obstruction, the possibility of permanent fistula formation is much greater.

Stricture formation at the site of the incision has been reported. Its occurrence should be infrequent if the trauma during removal of the stone is kept to a minimum. Treatment is by dilatation, as excision of the stricture is not to be lightly undertaken.

Post-Operative Regimen.

A stone has formed and required surgical intervention; and it is surely rational to attempt an analysis of the ætiological factors. In many cases, when the urine is uninfected, when the general nutrition of the patient is good and when the ureter is not kinked or obstructed, we have to confess to a lack of knowledge as to why the stone formed and what steps will prevent a recurrence.

Observations of great interest have been made in this respect; and the evidence would point to stasis, sepsis (whether focal or local), vitamin *A* deficiency, metabolic disturbances such as hyperparathyreoidism, and dietary errors, as being factors of varying importance. Much work has yet to be done, and each case must be assessed individually; but Higgins has reported a reduction in the incidence of recurrent renal lithiasis from 16·4% to 4·7% over a three-year period by a close attention to these points.

Summary.

1. Many ureteral stones will pass spontaneously, whilst the majority requiring treatment can be dislodged by cystoscopic manœuvres.
2. Persistent and heroic measures to move a stone at the risk of damage to the ureter are to be condemned.
3. Exact localization of the stone should be made immediately prior to operation.
4. An attempt to assess the ætiological factors should be made in every case. Recurrence can be diminished by appreciation of these factors.

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THE RADIOLOGICAL ASPECT OF THE TREATMENT OF URETERIC CALCULUS.[1]

By D. G. MAITLAND, M.B., B.S., B.Sc. (Sydney), D.R. (Edinburgh),
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ALTHOUGH the subject under discussion this evening is the treatment of ureteric calculus, yet such a consideration cannot entirely be divorced from the subject of urinary lithiasis as a whole.

A calculus that is fixed in a calyx or in the pelvis of a kidney rarely causes pain; but seldom, if ever, is it harmless in its effect upon the kidney.

Renal calculi, therefore, may be silent in regard to symptoms, and may be accidentally discovered during other radiographic investigatons; but the

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on April 28, 1938.

clinical picture is different where a calculus offers an obstruction to the outflow of urine at the pelvi-ureteral junction or in the ureter. Sudden over-distention of the renal capsule produces the characteristic symptoms of renal colic.

Prior to the adaptation of X rays as an aid to diagnosis, calculi were rarely diagnosed in the urinary tract unless great pain, hæmaturia and attacks of vomiting were the salient features of the patient's condition.

Renal stones may occur singly or in numbers, and be unilateral or bilateral, but in most instances they are found in only one kidney. These calculi or portions thereof may become detached; and, if they are sufficiently small, they may become impacted at the pelvi-ureteral junction or along the course of the ureter, especially at, or near, the uretero-vesical junction, where the lumen is narrowed in its oblique passage through the bladder wall.

The radiographic investigations that may be carried out in suspected ureteric calculus are: (i) plain radiography, (ii) retrograde pyelography and pneumopyelography, (iii) excretion pyelography.

A further method, which is suitable in children when the intravenous method is impracticable or undesirable, is by the oral administration of "Hippuran"; but it, at present, has the disadvantage that excretion through the kidneys is slow, and that the shadow of the unabsorbed ingested opaque dye lying in the gastro-intestinal tract tends to obscure the shadows of the renal calyces, pelves and ureters after excretion has commenced.

Radiographic technique is a most important factor, and adequate preparation of the patient is essential in order to eliminate as far as possible shadows of gas and fæces in the bowel. I prefer two vegetable laxative pills and 30 cubic centimetres (one ounce) of liquid paraffin taken the night before examination, and an ordinary light breakfast taken on the morning of the examination.

A good film must show the kidney outlines and the ureteric and bladder areas free from extraneous shadows, and all movement due to respiration must be eliminated. Such a film should always be made prior to any catheterization or injection of an opaque medium, as the shadow of a small stone might easily be obscured by the overlying catheter or opaque medium. Even slight respiratory movements can obliterate the shadow of a small calculus from an otherwise technically good film.

In patients of small to average proportions calculi will be demonstrated in most cases except when the calculus is very small or is of the faintly opaque or transradiant variety. For this reason a "negative" report on patients with suggestive symptoms should never be accepted as final proof that a stone does not exist.

If a small shadow is demonstrated, it is not necessarily a calculus; and it must be proved to be one by further radiographic and urological investigations, such as excretion pyelography or the passage of an opaque catheter, and oblique films should be taken of that area. These oblique films are important and should always be employed, for a small calcified gland may directly overlie the ureter in the antero-posterior view, yet obviously be outside the ureter by its relationship to the opaque catheter in the oblique view.

A further important point is that, whenever practicable, an X ray examination should be carried out just prior to operation to ascertain the exact position of a ureteric calculus, for occasionally a stone may move or even pass within a few hours.

Shadowless renal and ureteral calculi and blood clots may be demonstrated in the ureteropyelogram as areas of translucency or as small filling defects. They may be suspected because of local spasm or apparent cessation of function on the affected side in an excretion pyelogram. A small kink in the ureter demonstrated by the injection of an opaque medium must not be confused with a small ureteric calculus.

The composition of urinary calculi has a definite bearing on the radiology of the urinary tract. Calculi vary in composition and in their relative density or shadow-casting properties according to their composition.

Calculi composed of calcium oxalate cast a dense shadow. Those composed of calcium phosphate cast a slightly less dense shadow, while those composed of xanthin or uric acid may cast no shadow and therefore be invisible in a plain radiograph, even though they may be quite large. Large cystin stones usually cast a faint shadow, but small ones are not apparent.

All variations of density of shadow may be obtained. The transradiant calculi may sometimes be demonstrated as "filling defects" or "negative shadows" in ureteropyelograms, and these must be differentiated from injected air-bubbles. Air-bubbles cannot, of course, occur in excretion pyelography. Uric acid stones are usually small and multiple and are often overlooked. The laminated calculi are composite stones made up of opaque and translucent salts.

The situation of a calculus, together with its relative density, is important in radiology; for the shadow of a calculus, even though comparatively dense, may not be apparent should it lie over the sacro-iliac region or directly over a transverse process.

Plain radiography, therefore, is an essential preliminary procedure; but a calculus may or may not be apparent, according to its composition or size, or it may be obscured by extrinsic shadows, slight movement, or the physical proportions of the patient.

I must emphasize "preliminary procedure" in connexion with plain radiography, for in the majority of cases it gives little information, whereas the excretion method may give the complete story.

No one at the present time would be satisfied with the result of a plain X ray examination of the gall-bladder when Graham's test can be simply carried

out; yet "plain ray of renal tracts (?) calculus" is still a frequent request.

The use of fluoroscopy and radiography during actual operation need not be dealt with in a discussion upon ureteric calculus.

A pyelogram will demonstrate the position of a calculus, the type of renal pelvis, and the degree of destruction of the secretory tissue of the kidney, and may be the deciding factor in conservative or radical surgery.

Colic—both renal and ureteral—is due to the blocking of the ureter in such a way that the urine overdistends the capsule of the kidney. If the calculus is in the region of the pelvi-ureteral junction it may act as a ball-valve, and a variable degree of obstruction and pelvic dilatation occurs. Should the calculus completely obstruct the ureter, total destruction of the kidney by hydronephrosis or pyonephrosis may result; and the danger from a renal stone that has become ureteric must be interpreted in terms of the kidney damage. It does not cease to menace the kidney until it has reached the bladder.

In most cases complete obstruction of the ureter does not occur. This ball-valve action is demonstrated by both the retrograde and excretion methods, which show the associated ureterectasis.

Calculi are more prone to move from the upper two-thirds of the ureter, and the most frequent site of their arrest is in the lower third. Oblique or semi-lateral films may be essential in such cases.

Pneumopyelography is the use of air as a contrast substance instead of the usual sodium iodide solution, or after the iodide solution has been removed. In selected cases it may give further information, but it is not usually employed.

Excretion pyelography is a useful ally, and particularly in suspected calculus. It cannot supersede the retrograde method because it depends upon the ability of the kidneys to excrete urea. Urea is the vehicle whereby the contrast substance passes through the kidneys, rendering the urine opaque to X rays.

This will explain the varying degrees of density of the shadows obtained in different cases, both normal and pathological, and will explain the apparent failure of the excretion method in cases of interstitial nephritis of the azotæmic type, in which there is already a deficiency in the power of excretion of urea. In such cases the excretion of contrast medium is so poor that practically no shadow of the upper part of the renal tract is apparent, yet the bladder eventually fills with the opaque urine which is being slowly excreted.

Excretion pyelography is of use in: (i) the identification of shadows, (ii) the determination of the intrarenal or ureteric situation of shadows, (iii) an approximate differential renal function test, (iv) the demonstration of coincident disease or anomaly in one or both kidneys.

Excretion pyelography should precede the retrograde method, and its value is greatest where there is some degree of urinary stasis such as in the condition under discussion this evening.

In acute ureteral colic due to stone it has been found that renal function is suppressed, and it is for this reason that excretion pyelography should be used as a routine in such cases. If there is rapid bilateral elmination of the opaque medium it can be stated quite definitely that there is no ureteric stone or blood clot.

In acute ureteral colic, whether the stone be opaque or transradiant, there will be a normal shadow of the opaque dye on the unaffected side; whereas there will be on the affected side either no excretion or delayed excretion, even up to some hours after injection.

Therefore, in the presence of ureteric calculus there is no optimum time for radiography after injection of the opaque medium, and the most striking films showing ureterectasis and pyelectasis above the site of obstruction may be obtained one or more hours after the injection. These are the chronic types in which there is an incomplete block. If the calculus completely blocks the ureter there will be no shadow of the opaque medium above the obstruction because of the functionless kidney.

Vesical calculus need not be dealt with, except by mention of the fact that a calculus situated within a vesical diverticulum may simulate a large calculus impacted in the distal end of the ureter, and a cystogram may assist in its differentiation. Radiography alone is not as dependable as the cystoscope because of the multiplicity of opaque shadows which may sometimes be found and at times cause confusion, such as a prolapsed, calcified ovary, calcified fibroid growths, calcified arteries viewed end on, and even large phleboliths. Phleboliths are usually round and multiple in the ordinary line of venous drainage. Ureteric calculi are more often fusiform.

The differential diagnosis of the various shadows which may occur upon a film forms at times an interesting problem.

Branched shadows superimposed over the kidney outline offer no difficulty; but shadows towards the periphery of the renal outline may be calculi, calcified tuberculous foci, calcified lymph glands, semi-organized blood clot, necrotic areas of a suppurative pyelonephrosis, or even calcified areas sometimes found in hypernephroma or teratoma.

Oat grains and small non-opaque foreign bodies have been introduced into the bladder, and by reverse peristalsis have eventually formed the nucleus of calculi in the bladder, ureter or kidney.

Gall-stones may on occasion simulate right renal or ureteric calculi, and Graham's test is of use in the differentiation of such shadows.

A calcified concretion in the tip of the appendix may simulate a right ureteric calculus. Other shadows may be colonic in origin, but a further film after adequate purgation will differentiate them from renal or ureteric calculi.

Calcified abdominal lymph nodes usually alter in relation to other structures and move with respiration; but a retroperitoneal gland may be a little more difficult to differentiate.

THE MANAGEMENT OF FACIAL INJURIES.[1]

By CHARLES H. OSBORN, F.R.C.S., F.R.A.C.S.,
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UNTIL the early years of the present century the speed of road transport rarely exceeded twelve miles an hour; but with the advent of the modern automobile and highway, and more recently of aeroplanes, the speed of transport has been stepped up enormously, and with this the frequency and severity of injury have been greatly increased.

In Victoria, in the year ending June 30, 1937, 17,813 accidents were reported, 421 people being killed. In Melbourne alone there were 13,922 accidents, in which 4,849 persons were injured and 231 killed; and we are all too well aware of the gravity of such injuries.

These injured individuals may be divided into two main groups: (i) the injured pedestrian or cyclist, (ii) the injured traveller in the vehicle.

In the first group the major injuries are principally those of the limbs, viscera, skull and brain. The injured traveller, on the other hand, usually suffers, in these days of closed cars, from injuries resulting from collision, so that the occupant is thrown forward from his seat as the result of sudden interference with the forward motion of the vehicle. Straith[(1)] has somewhat appropriately subdivided injuries resulting from such an accident into two groups, namely: (i) injuries to the driver ("steering post injuries"), (ii) guest passenger injuries.

STEERING-POST INJURIES.

The driver, supported by his position behind the steering wheel, in many cases avoids being thrown forward to the same extent as his passenger, and usually suffers to a less degree. However, it is not uncommon for the chin to strike the centre of the wheel, which results in contusion and laceration of the chin or fracture of the mandible, including the symphysis and necks of the condyles. If the force of the impact is greater, the face and nose may strike the rim of the wheel and more severe injuries to the nose and upper portion of the face result.

GUEST PASSENGER INJURIES.

The group of injured passengers largely consists of young women, and unfortunately the facial injuries sustained are usually more severe. This is accounted for by the absence of the support of the steering wheel and the fact that such a passenger has commonly less warning of an impending accident and is less prepared to resist. The mid-portion of the face is crushed against the instrument board, injuries to the maxillæ, nasal and malar bones, the orbit and eyeball being produced, together with severe lacerations resulting from contact with projecting knobs and buttons. In addition to the above, front-seat passengers are liable to severe lacerations of the facial integument by broken glass. The aforementioned persons provide by far the greatest number of patients with severe facial injuries encountered in practice today; but, needless to say, countless other causes may produce injuries of a similar nature, and their management will be identical.

IMMEDIATE TREATMENT.

It stands to reason that the emergency treatment to these patients must first be directed towards the control of hæmorrhage and the treatment of shock, until conditions for careful management of the local facial lesions are favourable. Hasty local care and the neglect of well-established surgical principles will jeopardize the patient's future in so many ways that it is necessary to emphasize the following points:

1. Careful examination and cleansing of lacerations.
2. Careful palpation of the nose and intranasal inspection.
3. Palpation of the facial bones, with particular attention to: (*a*) separation of the malar attachments, (*b*) depressions and eversions of the zygoma, (*c*) irregularities of the orbital margins, (*d*) anæsthesia of the lateral surface of the nose and upper lip.
4. Inspection and palpation of the oral cavity, with special reference to the "bite".
5. Palpation of the mandible.

The swelling that ensues may make an unduly delayed examination most difficult and inaccurate, deformities being subsequently revealed that could well have been easily corrected had they been observed earlier.

Straith[(1)] has said: "More pitiable even than the immediate period of pain and disability is the suffering through long bitter years of mental agony, of those left with lasting conspicuous facial disfigurements." To prevent this, meticulous care must be exercised in wound closure; it should be done as a set operation under the best conditions, and well repays time spent upon it. Fortunately the facial integument has remarkable powers of recovery, and with ordinary care suppuration is rare; but certain principles of wound closure should be closely adhered to. These are: (i) conservation of tissue, (ii) trimming of edges, (iii) careful suturing, (iv) suitable dressings and after-treatment.

Conservation of Tissue.

Débridement is rarely necessary. Severely contused skin recovers in a remarkable fashion. When portions are almost completely severed, these are preserved for use if necessary as a Wolfe graft.

Trimming of Edges.

Jagged edges are carefully trimmed to straight lines; this procedure ensures a much neater subsequent scar and avoids small humps and depressions.

[1] Abridged version of a paper read at a meeting of the Victorian Branch of the British Medical Association on March 2, 1938.

Suturing.

In deeply incised wounds involving the muscle layer, buried coaptation sutures are necessary to effect repair of severed muscles as well as to obliterate dead space. Failure to accomplish this last provides a common cause for the subsequent breaking down of wounds after several days, and vitiates the final result. There is no objection to the use of a very fine absorbable material for this; number 0000 chromicized catgut serves the purpose very well. A fine half-circle, round-bodied needle, about number 18 to 20, with a split eye (the French needle), is well adapted for inserting this layer of sutures, which should be interrupted and not continuous. For the closure of the skin edges two methods are available. Michel clips, silkworm gut or other coarse suture material should not be used in these cases, as the resultant scar is likely to be a permanent disfigurement. The two methods recommended are: (i) the subcuticular suture, (ii) the fine dermal suture.

The Subcuticular Suture.

A fine waxed silk is used with a number 18 half-circle cutting-edged needle. This is introduced first about 1·25 centimetres (half an inch) from one end of the wound and brought out just within the extremity of the wound itself, and from this point the suture is continued at intervals of 0·3 centimetre (one-eighth of an inch), the corium being picked up at opposite points. In order to facilitate its subsequent removal the suture is brought to the surface about every 1·9 centimetres (three-quarters of an inch) and once more reinserted. When the closure is completed the needle is passed out at a similar position at the opposite end to which it was inserted, two long ends thus being left.

The Fine Dermal Suture.

There are several varieties of suture material obtainable which are characterized by their fineness and strength, and are especially prepared for use in plastic work, so as to avoid irritation and the absorption of serum. An excellent brand is "Deknatel", and it can be used "gossamer fine". With fine needles and a light needle-holder designed for the purpose, interrupted sutures are inserted at intervals of about 0·3 centimetre (one-eighth of an inch). In doing this it is wise to avoid injury to the skin edges; therefore fine-toothed forceps, such as Adson's *dura mater* forceps, or better still, two fine skin hooks, as used by Sir Harold Gillies, should be employed. The knots should be kept from the line of the wound and the ends should be left long.

Dressings and Subsequent Care.

The skin surrounding the wound, but not the wound itself, is painted with "Mastisol" and an antiseptic dressing of several layers of double cyanide gauze is applied. Another method is to apply a strip of silver foil over the wound, keeping it in place by moistening with spirit.

Over the dressings, at right angles to the wound, extended strips of "Elastoplast" are applied; for care should be taken to avoid the broad scar that may result if the wound does not lie in the direction of Langer's lines.

When interrupted suturing has been used, alternate sutures are removed in twenty-four hours, and the remainder usually in two days. In the case of the subcuticular suture three days are usually allowed to elapse before withdrawal.

To avoid tension on the wound after the removal of sutures, transverse strapping is advisable for about ten days.

FRACTURES.

Fractures of the Nose.

Fractures of the nose are frequently overlooked, the swelling and ecchymosis being regarded as due to soft tissue injury only. A careful examination is essential, otherwise a noticeable deformity may be evident after the swelling has subsided. Successful reduction of any displacements requires anæsthesia, and it will be found that local infiltration with 1% "Novocain" solution along the naso-labial folds, and intranasal packs of cocaine and adrenaline solution are usually sufficient.

Simple deviations or spreading of the nasal bones can be corrected by thumb pressure externally. When the depression is more severe, or one nasal bone is depressed below the other, a blunt instrument, covered by a small piece of close-fitting rubber tubing, can be inserted through the nostril and elevation effected from within. Special forceps (Walsham's), with an intranasal and an extranasal blade, may also be used effectively for replacement. Reference to Gillies and Kilner's diagram of the common bone displacements shows the manœuvres necessary to effect replacement in these more complicated fractures (see Figure I). If there is a tendency to recurrence, gauze packing high up between the septum and lateral nasal walls serves as an internal splint, but is best avoided if possible.

Some form of external splinting is advisable after replacement carried out as above, and this serves also to limit the amount of subsequent swelling. Moulded soft metal, such as tin, on the inside of which is applied double-sided adhesive plaster, serves this purpose well; alternatively, a mould made from dental compound or gauze rolls held in place by "Elastoplast" strapping may be used.

In nasal injuries due to severe crushing a more complicated splint will be necessary. The one designed by Straith, attached to a plaster head cap, can be adjusted for all types of displacement and leaves exposed the skin of the nose and face for the dressing of any associated skin wounds (see Figure II). Another splint, attached to a dental appliance with an outrigger, may be used to support the nasal structure from within.

When these crushing injuries are complicated by severe soft tissue wounds and are thus externally compound, conservation of tissue is of paramount importance. If actual skin loss has taken place, immediate full-thickness skin grafting is recommended, suitable sites for obtaining the graft being

the upper eyelid or the skin covering the back of the ear.

Malar Fractures.

Depressed fractures of the malar-zygomatic compound produce conspicuous deformities if left untreated. Displacements here again are sometimes overlooked at the time of injury on account of the rapid swelling which takes place. The following signs and symptoms are helpful in the diagnosis: unilateral epistaxis owing to fracture into the antrum, mechanical obstruction to jaw movements, numbness over the infraorbital nerve, diplopia and bruising.

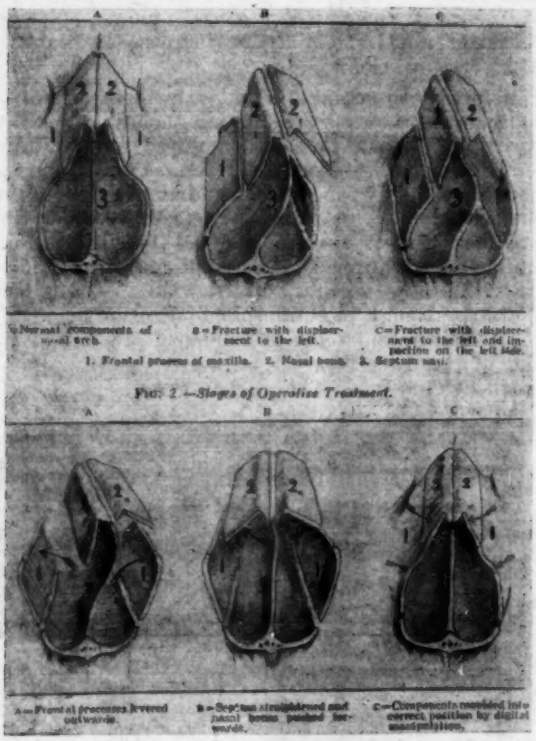
A
B
C
A—Normal components of nasal arch.
B—Fracture with displacement to the left.
C—Fracture with displacement to the left and impaction on the left side.
1. Frontal process of maxilla. 2. Nasal bone. 3. Septum nasi.
FIG. 2.—Stages of Operative Treatment.
A
B
C
A—Frontal processes levered outwards.
B—Septum straightened and nasal bones pushed forwards.
C—Components moulded into correct position by digital manipulation.

FIGURE I.
Reproduced from paper by Gillies and Kilner.[2]

A skiagram taken in the occipito-mental plane will reveal the site of injury. Careful leverage of the depressed bone back into position may be accomplished by a variety of methods, the one employed being determined by the conditions associated with the individual case.

1. The first method consists in grasping and elevating the zygomatic extremity with a large towel clip.

2. In Straith's method[1] a curved instrument is inserted through the mucous membrane, behind the last upper molar tooth, up and beneath the malar bone, behind the maxilla (Figure III).

3. Watkin's method[3] is designed to elevate the bone by means of a blunt instrument inserted through an intranasal antrostomy opening, thus permitting evacuation of the blood-filled maxillary antrum at the same time.

4. Gillies and Kilner[4] described a simple and effective method of passing a strong elevator through

FIGURE II.
Reproduced from paper by C. L. Straith, showing the nasal assembly attached to the special head splint incorporated in a plaster head cap. This illustration also shows a wire holding the superior maxilla in place (Federspiel's method).

FIGURE III.
Straith's method of elevating the fractured malar-zygomatic compound by use of a curved antrum trocar.

a small incision above the hair line in the temporal region, down to and beneath the root of the zygomatic process, which is then levered outwards (see Figure IV).

5. If the above methods fail to maintain proper elevation the fragments may be wired in place through drill holes at the frontal attachment.

Fractures of the Jaws.

Fractures of the jaw bones probably present the most important aspect of major facial injuries, although there seems to be a general lack of appreciation of this on the part of most medical practitioners. Fracture of the jaw is regarded by

FIGURE IV.
Gillies and Kilner's method of elevating the depressed malar-zygomatic compound.

many as a purely dental problem, and in so far as the underlying principles of treatment resolve themselves into the restoration and maintenance of a normal occlusal plane, this opinion may to some extent be justified. There are, however, other considerations, and in view of the fact that these fractures, particularly when they are the result of automobile accidents, are so frequently complicated by injury to soft tissues and also associated intracranial injuries and shock, they automatically come under the surgeon's care first. It seems to be little known that in the fixation of these fractures simplified methods are available, requiring only a moderate degree of technical skill and no special apparatus.

A certain number of the more complex problems do undoubtedly demand the skill of a competent dentist, who himself must have had adequate experience in handling these cases, and one must not lose sight of the fact that the technical details of treatment have in a large part been designed by members of the dental profession. A friendly cooperation therefore is to be encouraged; but also it must surely be a part of the medical man's equipment to have a knowledge of the methods available for the treatment of these fractures.

In these cases undue delay in reduction and fixation is as prejudicial as in fractures of other bones, and in view of the fact that jaw fractures are usually compound into the mouth, delayed reduction and immobilization increase the liability to severe infection.

Before proceeding with the treatment of individual fractures of the jaw bones a detailed description of the methods employed for obtaining adequate effective fixation in the occlusal plane is necessary. This type of fixation implies wiring of the mandibular and maxillary teeth together and provides perfect splinting in all but exceptional cases and is obtained by the well-known method of intermaxillary wiring. It is wise to state here that any attempt to obtain immobilization by wiring together adjacent teeth in the same jaw across the line of the fracture alone is totally inadequate and frequently does more harm than good.

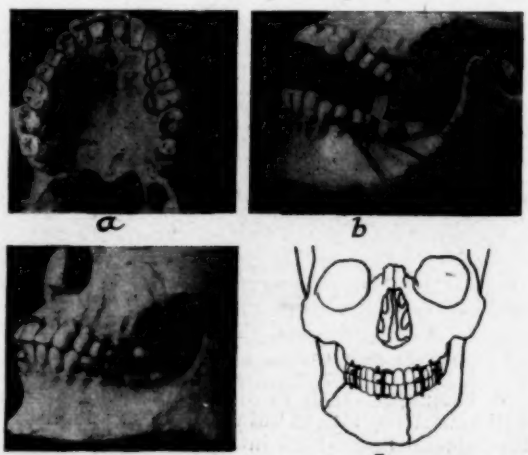

FIGURE V.
Ivy's eyelet method of interdental wiring. (*a*) The wire passed around two adjacent teeth ready to be twisted on the buccal aspect; (*b*) wires inserted through the eyelets; (*c*) the retaining wires twisted together maintaining occlusion; (*d*) showing application in double fracture of the mandible.

Dr. Gilmer, of Chicago, in 1887, first suggested interdental wiring; but the method most commonly used today is Ivy's eyelet method.[5] Brass wire (24 gauge) or twisted stainless steel wire is used. The technique of the application is seen clearly in the accompanying diagrams (Figure V). A

variety of modifications of this simple method are invoked under varying dental conditions and will be mentioned in the appropriate place. Reference will be made on several occasions to the arch wire. This, as its name implies, is a band of wire stretching around the necks of the teeth from the molars on one side to the molars on the other, on the buccal and labial aspects. Risdon's method for the application of this wire is as follows:

A long brass wire is twisted firmly around each last molar tooth. These wires from each side are then twisted together in front, thus providing the arch. These arch wires are themselves firmly wired to all the teeth. An arch wire may be used on each jaw.

Winter's arch bar (the Jelenko fracture splint) (see Figure VI) is a ready-prepared arch bar, with lugs attached to its buccal and labial aspects, made from 18-carat cased gold. The lugs are provided for the attachment of wires or elastic bands. The splint is anchored around the teeth (generally five or six in each arch are sufficient) by ligature wires already placed in position.

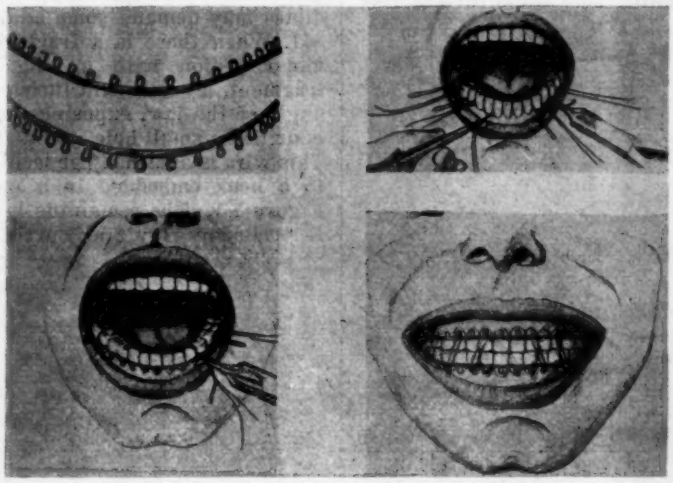

FIGURE VI.
The arch bar with lugs and its method of application.

The cast metal cap splint can be very effectively employed in some simple mandibular fractures when the fragments have little tendency to displacement. It must be constructed by the dental surgeon and has the advantage that in those cases in which it is suitable, free movement of the mandible is permitted (see Figure VII).

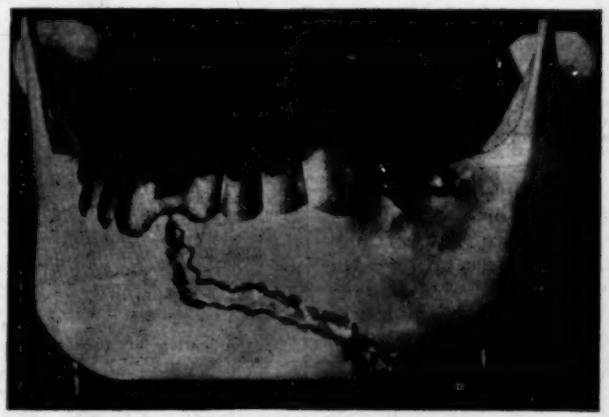

FIGURE VII.
The cast metal cap splint.

Fractures of the Maxilla.

The displacements of fragments in fractures of the maxilla are due almost entirely to the traumatizing force itself, as there are no powerful muscles attached to the maxilla.

In the unilateral fracture the split usually extends through the hard palate, obliquely backwards, above the level of the teeth, thus freeing the alveolar process on this side. By manipulation the fragment can usually be replaced and maintained in accurate position by intermaxillary wiring on the sound side.

The bilateral fracture may traverse: (*a*) a transverse plane through the antra, with or without radiating fracture lines through the palate or alveolar processes, or (*b*) a transverse plane through the orbits, nasal cavity and pterygoid or zygomatic processes. In these fractures the whole upper jaw is liable to be displaced backwards, and as only the last molars occlude, an open bite results. Injuries to the sixth nerve, the globe or the optic nerve, together with crowding of the Eustachian cushions and its sequelæ, may complicate the case.

Where there is little displacement or excursion, chewing should be prohibited for three weeks, and careful watch should be kept as to any increase of false movement. Usually, however, the great displacement and excessive mobility demand a more complicated procedure. Ordinary intermaxillary wiring is inadequate or account of the mobility of the mandible, and therefore some extra-oral method is necessary to effect immobilization. Federspiel's technique provides a satisfactory and simple method (see Figure VIII). A number 12 half-round steel wire is attached firmly to the teeth of the upper arch. A brass fracture wire attached to this in each bicuspid region is passed through the cheek just above the malar bone on each side. Then a plaster head cap is applied with coat-hanger wire attachments incorporated in it, and to these are attached the brass wires after the displaced maxilla has been forced back into position. At the end of ten days the upper and lower teeth can be fastened together by wiring and maintained in

occlusion for three or four weeks, until union is complete.

The Fractured Edentulous Maxilla.—The edentulous fractured maxilla may be treated in the same manner, by the drilling of holes between the teeth of the denture and attachment of traction wires to the artificial teeth until there is no further risk of displacement.

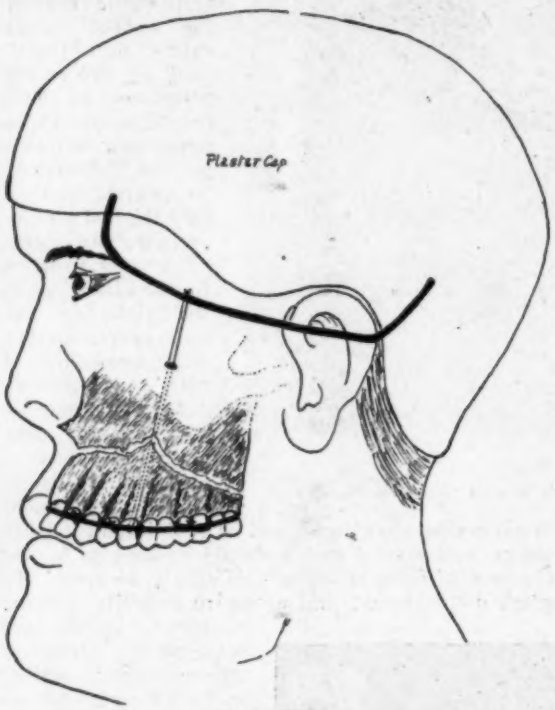

FIGURE VIII.
Federspiel's method of controlling a fractured maxilla. Traction wires attached to an arch bar pass through the cheek and are fixed to coat-hanger wire incorporated in a plaster cap.

Mandibular Fractures.

In the diagnosis of fractures of the mandible X rays are indispensable. Two lateral jaw exposures are insufficient. Fractures of the symphysis and fractures of the necks of the condyles are often missed. For the last, the mastoid technique or focusing through the opposite sigmoid notch is satisfactory.

Bandaging with a view to immobilization of fractures of the lower jaw is distinctly contraindicated. The time-honoured four-tail bandage is not only useless but a positive menace. The diagonal pull it exerts tends to increase any displacement that may be present, and it provides no immobilization whatever, as any patient who has been subjected to this method of treatment will readily avow.

A modification of the Barton bandage (see Figure IX), consisting of a close-fitting surgeon's cap, to which is pinned a sheet of dental rubber dam encircling the lower jaw, placed to ensure a direct upward elastic pull, may at times be used as a temporary support and as an additional measure in certain cases.

Direct wiring or plating the bone across the fracture line in recent fractures is strongly condemned. In about 90% of cases the interdental eyelet wiring or the dental arch wire can be used effectively. The remaining 10% of fractured mandibles may demand some additional procedure.

1. When there is a fracture in the premolar or molar region with a long edentulous posterior fragment, a small skin incision is made behind the angle of the jaw, exposing the bone. Through this is drilled a small hole, and a silver wire is threaded. This wire is attached per medium of an elastic band to a hook embedded in a plaster head cast (see Figure X). The remaining large fragment is wired in occlusion (Ivy and Curtis[10]).

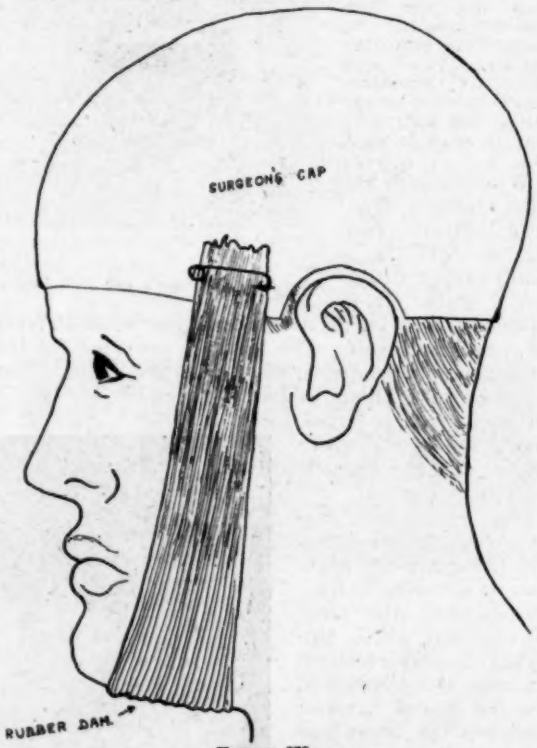

FIGURE IX.
Modification of Barton's bandage for fracture of the mandible.

2. When in a similar fracture to the last mentioned, although the mandibular teeth are present, there are no opposing maxillary teeth, the treatment is similar to that for fractures in the first group, with wiring of the large fragment to the upper denture if necessary. Here the metal cap splint with a posterior prolongation over the edentulous portion in the upper jaw can also be used satisfactorily.

3. When an associated maxillary fracture is present: (*a*) Federspiel's method is used for the maxilla and an arch bar wired to the mandible, elastic traction being applied between them; (*b*)

ILLUSTRATIONS TO THE ARTICLE BY DR. REGINALD WEBSTER.

FIGURE IX.

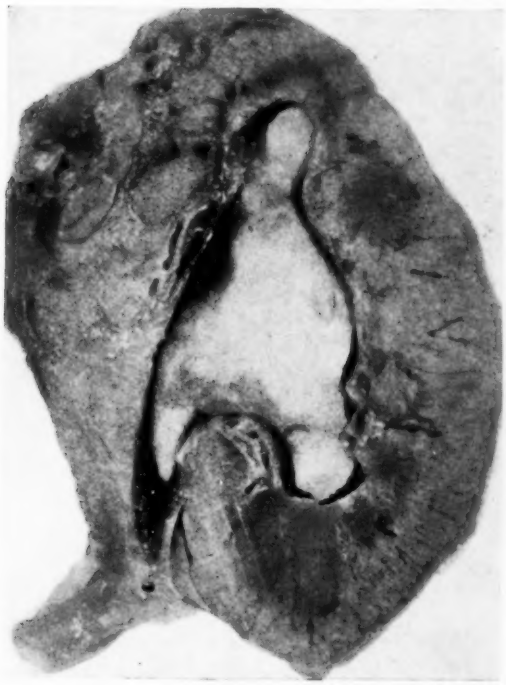

FIGURE X.
"Staghorn" calculus occupying pelvis and calyces of left kidney.

FIGURE XI.

ILLUSTRATIONS TO THE ARTICLE BY Dr. W. E. ROBERTS.

Figure III.

Figure IV.

ILLUSTRATIONS TO THE ARTICLE BY Dr. KEITH R. MOORE.

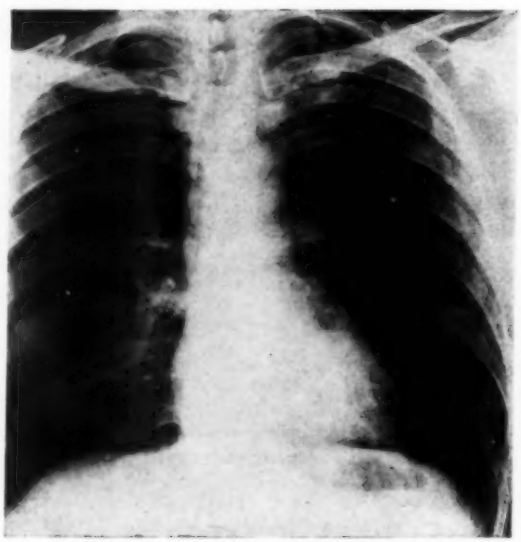

Figure I.

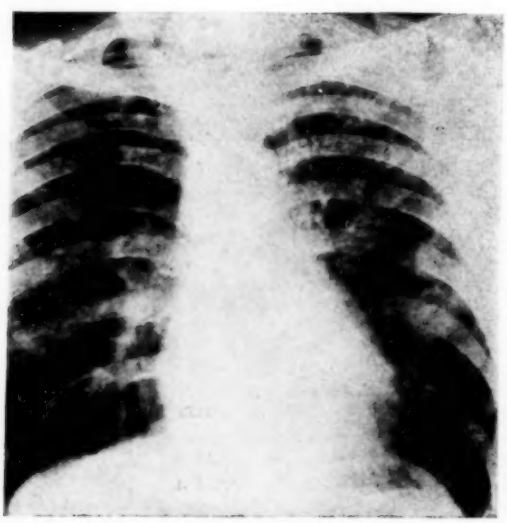

Figure II.

the Gunning splint is used when upper and lower jaws are both edentulous.

4. When there is lack of a needed tooth in a key position in the upper jaw, a wire arch or Winter's arch bar is attached to the necks of the remaining teeth and then the jaws are fixed with intermaxillary wiring (see Figure XI).

5. In fracture of the mandible, when the maxilla is edentulous, the arch bar is attached to the teeth of the mandible, and this is connected to the upper artificial denture, fixation being assisted by an elastic Barton bandage attached to a head cap.

6. If the mandible is edentulous, accurate replacement is not so necessary, because in subsequent dentures any deficiency of alignment can be allowed for; but immobilization is important and can be attained by the circumferential wiring of Black. An

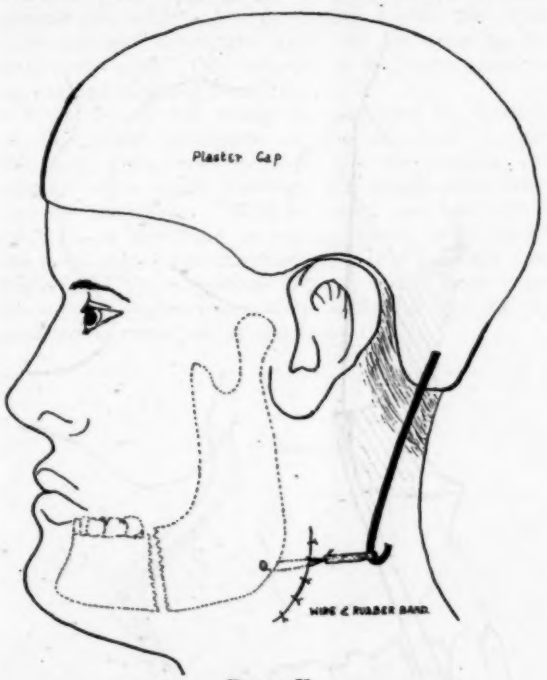

FIGURE X.
Method of controlling a long posterior edentulous fragment in mandibular fractures.

impression is taken when the fragments are reduced, and from this a cast is made of vulcanite or metal. This is retained in place by wires inserted through skin incisions below the inferior borders of the jaws. This splint is kept in position for five weeks.

7. Uncontrollable backward displacement of the chin fragment in a double fracture may require traction from: (*a*) a forward extension bar on an upper dental plate, (*b*) an outrigger from a plaster head cap. The latter is probably the simpler method. Two wires are passed through holes drilled in the symphysis fragment, emerging through the skin of the chin. These wires are attached to an outrigger moulded wire embedded in a plaster head cap.

Fractures of the Neck, Condyle or Intramuscular Part of the Ramus.—In fractures of the neck, condyle or intramuscular part of the ramus, provided the large fragment bearing the teeth is maintained immobilized in the occlusal plane by interdental

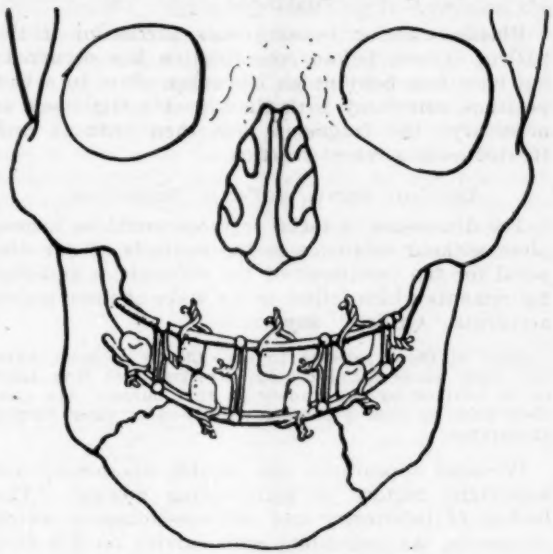

FIGURE XI.
The use of arch bars with irregularly spaced teeth. (Reproduced by courtesy of F. A. Figi, *Surgery, Gynecology and Obstetrics*, Volume LV, 1932, page 762.)

wiring, the final result as far as union and the bite are concerned will be good. It is true that a wry open bite may result; but as this is of little moment, more complicated procedures are rarely necessary. Where the condyle itself is dislocated mesially it is occasionally necessary to remove it through a small external incision (Stromberg[6]).

Non-Union.

Every fracture that traverses a tooth socket at which there is perceptible movement is compound and should be drained through an external incision made just under the lower border of the jaw. This prevents abscess, delayed union, necrosis or grave sepsis. (Ivy.)

Non-union is rare and is usually due to: (i) delayed or improper immobilization; (ii) suppuration due to the retention of roots of infected teeth in the line of the fracture; (iii) loss of bone, for example, gunshot injury; (iv) loss of bone due to necrosis.

The treatment follows in essentials that for non-union elsewhere, and is first directed towards the possible elimination of its cause, namely, drainage, removal of sequestra and excision of fibrous tissue. Where there is a loss of bone the gap should be dealt with by bone grafting, success depending on the following particulars: (i) all suppuration should have ceased; (ii) fixation of fragments in proper position should previously have been accomplished after removal of fibrous adhesions (here the metal cap splint is most valuable); (iii) invasion of the oral cavity is to be avoided at the operation; (iv)

a graft taken from the iliac crest or tibia should be inserted through an incision below the inferior border of the jaw; (v) immobilization should be continued for at least ten weeks.

Mal-Union.

Elastic traction is sometimes successful if the patient is seen before consolidation has occurred; but once firm bony union has taken place in a bad position, osteotomy with the aid of a Gigli saw is necessary; the fragments are then reduced and treated as in a recent fracture.

The Late Repair of Facial Deformities.

The discussion of facial injuries would be incomplete without reference to the methods at our disposal for the treatment of the deformities and disfigurements which follow in the wake of these major accidents. Gillies[7] says:

> Many of these patients in one ghastly moment have had their whole facial contour wrecked, and they need to be fortified by the knowledge that surgery can give them back at least a passable imitation of their former appearance.

Personal appearance and mental equanimity are important factors in maintaining morale. The feeling of inferiority and self-consciousness which enshrouds the individual who carries on his face some obvious blemish, whether it be unsightly scars, a deformed nose or ingrained flecks of road dust, influences his whole life. The influence which congenital or acquired deformity plays in the determination of personality is known to most of us; but it is true also that many physicians are too often unaware of the serious handicap imposed on those individuals with some facial, often minor, disfigurement. Their opportunities in both the marriage market and the employment bureau are prejudiced enormously. Imagine what few positions in our

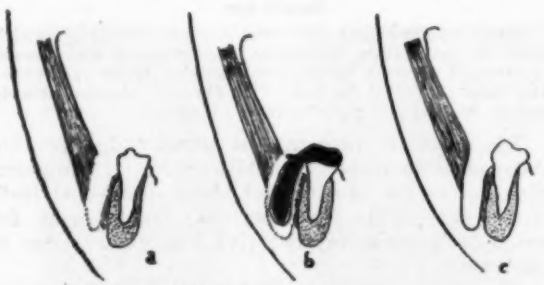

FIGURE XII.

The buccal inlay, showing: (*a*) scar tissue obliterating the buccal sulcus divided; (*b*) the Thiersch covered mould attached to a cap splint in position; (*c*) the new epithelialized sulcus.

present society are available to the girl or young man of unsightly appearance. The function of reconstructive surgery is to rehabilitate these individuals as far as possible, and although it is quite beyond this paper to deal with such a large subject at any length or in any detail, the scope of secondary operations will be briefly mentioned.

Skin losses should be replaced as early as possible; but no other plastic procedures should be attempted until at least two months have elapsed after all infection has disappeared, nor should they be undertaken until sufficient time has elapsed to allow assessment of the full extent of the permanent deformity.

Excision of Scars.

The appearance of depressed or irregular scars or those in which flecks of asphalt have remained embedded can be improved considerably by appropriate excisions. Undercutting permits accurate approximation without tension, and the implanta-

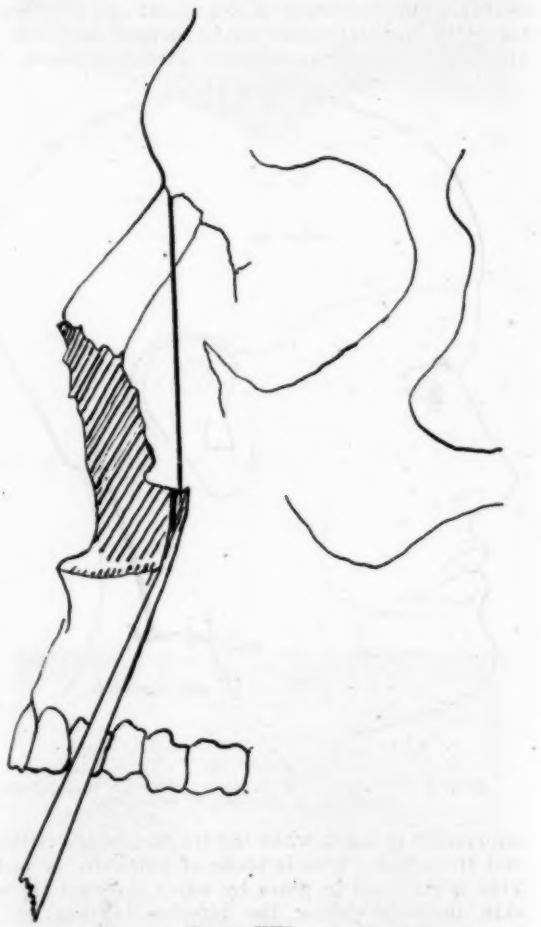

FIGURE XIII.

Rhinoplasty: the line of bone division. (After Sheehan.)

tion of fat grafts from neighbouring areas or from the abdominal wall will serve to obliterate unsightly depressions. The shifting of the scar from its depressed position by a greatly modified form of "face lift", done through an incision within the hair line, can be effectively employed. The details regarding cleanliness, care in suturing and after-treatment are similar to those mentioned earlier.

Where loss of skin has resulted in severe scarring, perhaps causing deformities of the eyelids, nose or lips, some form of full-thickness grafting, either free or pedicled, will be necessary.

Repair of Bony Deformities.

Where there has been extensive loss of alveolus or injury to intraoral soft tissues, resulting in loss of the buccal sulcus, a new sulcus must be fashioned in order to maintain an efficient denture. Simple division of scar tissue without provision for some immediate epithelial covering invariably results in failure to accomplish the desired object. Esser's buccal inlay method, as modified by Gillies and Kilner,[8] in which a mould covered by Thiersch grafts and attached to a denture is applied to the new-formed cavity, satisfactorily overcomes the problem (see Figure XII). The multitudinous procedures which are embraced under the term "rhinoplasty" illustrate what can be done to the unshapely nose. One or two of the more common operations demand mention.

Deviation of the bridge is corrected by division of the nasal processes of the maxilla through bilateral intranasal incisions in the lateral vestibular walls made between the upper and lower lateral cartilages. With a nasal saw or chisel, division of the bone is accomplished, after which the nasal bones are moulded back into position (see Figure XIII). Needless to say, many such cases demand the correction of a deflected septum by submucous resection at the same time.

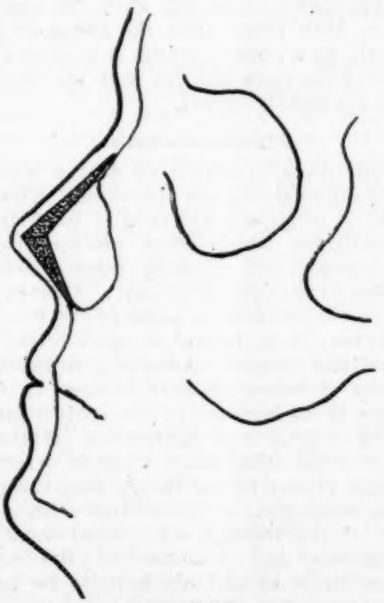

FIGURE XIV.
Rhinoplasty: the hinged graft in position.

Old depressed nasal fractures require the additional procedure of a supporting cartilage or bone graft.

Splaying of the nose may be partly corrected by bone division as described above, and the contour of the bridge may be restored by the introduction of a graft cut from the costal cartilage, which may be improved by the inclusion of some bone (McIndoe[9]). When the nasal tip is depressed the graft may be hinged, and thus the normal elevation of the nose tip is restored (see Figure XIV). The elevation of the depressed tip and the reconstruction of the nostrils by corrections of the deformity of the alar cartilages present no insuperable difficulties; but it would be inappropriate to enter into the technical details here. There are in fact few such deformities that could not be improved by plastic procedures. Such surgery is more than justified, and these people are frequently one's most grateful patients.

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THE APPEARANCE OF THE EYELIDS IN CERTAIN DISEASES.

By T. M. MANSFIELD, M.B., Ch.M., D.O.M.S.,
Brisbane.

GROSS defects of the eyelids are usually obvious at a glance; but a careful inspection and comparison of both sides should be made in the course of every routine examination, as slight degrees of narrowing or widening of the palpebral fissures may give useful information in certain nervous diseases. It is proposed here to give a simple brief outline of the neurology of the eyelids and the underlying causes of ptosis and its opposite—blepharodiastasis.

The muscles of the eyelids are innervated by the third and seventh cranial nerves and by the cervical sympathetic; while the ophthalmic and maxillary divisions of the fifth cranial nerve supply the sensory innervation.

The oculomotor nerve supplies the *levator palpebræ superioris* and the sympathetic supplies the involuntary tarsal muscle of Müller in both upper and lower lids. Hence the eye is opened by the third nerve and sympathetic and is kept open by the latter. It is closed by the inhibition of these two and stimulation of the branches of the facial nerve supplying the *orbicularis oculi* muscle. A paralysis of the third or of the sympathetic or a stimulation of the seventh will produce ptosis; while, conversely, a paralysis of the seventh and stimulation of the third or the sympathetic will give rise to a widening of the palpebral fissure.

Ptosis.

Ptosis may be congenital and may be unilateral or bilateral, and every degree from a just perceptible droop of the upper lid to a completely closed eye may be met with. This condition is usually due to an absence of the levator muscle or to defective development of the muscle or third nerve nucleus.

Œdema, inflammation (trachoma, conjunctivitis *et cetera*), tumours of the upper lid, lack of support due to a shrunken or an absent globe, injury to the levator or its nerve supply by wounds and fractures about the orbit, these are all causes of a drooping lid and must be thought of in such a case.

Apart from these local conditions ptosis is generally due to paralysis of the oculomotor nerve, and it is common and usually found in *tabes dorsalis*, syphilis, disseminated sclerosis, *encephalitis lethargica* and ophthalmoplegic migraine. The accompanying eye signs are a paresis of the ciliary muscle, the *sphincter pupillæ*, and the extraocular muscles supplied by the third, resulting in defective accommodation, dilatation of the pupil, and lateral squint; but the ptosis may alone be present.

A bilateral ptosis may be the result of *myasthenia gravis*, when it is often associated with diplopia. It may also be found in *dystrophia myotonica*, *encephalitis lethargica* and hysteria.

Unilateral ptosis due to cervical sympathetic paralysis is seen most often in *tabes dorsalis*, also in injuries to the neck, glandular enlargement and neoplasms of the neck, apical tuberculosis and lesions of the pons, medulla and cord. Accompanying the ptosis in these cases we find also a paralysis of the *dilator pupillæ* involuntary muscle, causing a contracted pupil as well as a retracted eyeball; there are also disturbances of temperature and sweating on the same side of the face.

Sympathetic impulses begin in the subthalamic region and pass down into the lower cervical and upper thoracic regions of the cord; thence they pass by white rami to the inferior cervical sympathetic ganglion, then upwards to the superior cervical sympathetic ganglion in the neck, to be distributed from plexuses surrounding the internal carotid artery and the ophthalmic artery. This is the course of impulses which reach the eye, and any lesion interfering with this tract is likely to give ocular signs.

In blepharospasm there occurs a spastic contraction of the *orbicularis oculi*, causing a narrow palpebral fissure; it is reflex as a rule from lesions in the eye itself or the conjunctiva, and is due to photophobia and asthenopia. Tic, of unknown origin, may also cause blepharospasm. Myopic people often affect small palpebral apertures, and the term myopia originates from this peculiarity, whereby they attempt to increase the distinctness of the image on the retina. Fibrillary twitchings of small bundles of muscle fibres of the orbicularis are usually due to eye strain and are often more noticeable to the patient than the observer. A contracture of the orbicularis on one side may produce a small degree of ptosis, when a patient is recovering from Bell's palsy, and this type of contracture seems to be peculiar to the face muscles.

Tonic and clonic facial spasms, including spasm of the muscles closing the eye, can be caused by a tumour near the eighth cranial nerve in the cerebello-pontine angle, causing irritation of the seventh nerve. In such a case one would also expect papillœdema to be present.

Occasionally the eye-closing muscle may be innervated by fibres from the nucleus of the third nerve, and a point in connexion with third-nerve palsies may help to determine whether the lesion is central or peripheral. If it is nuclear, then as well as the paralysis of the third nerve muscles there will be on the same side a paresis of the eye-closers, and it will be easy to force open the upper lid against the patient's efforts to squeeze the lids tightly together. If he can shut the eyes equally tightly on both sides, then the lesion is probably peripheral. In a normal person it is quite a difficult matter to force open the lids with the fingers when the eyes are tightly closed.

Blepharodiastasis.

The conditions in which we find a widely open eye, blepharodiastasis, are numerous. Those which give rise to proptosis are usually local in origin: first, conditions which effect an increase in the orbital contents, and secondly, those which cause a diminution of the orbital capacity. Graves's disease is perhaps the commonest cause of the first, and the proptosis may be unilateral or, more often, bilateral and sometimes unequal. According to Foster-Moore, the theory of causation that is most in favour is that there is an increase in the orbital fat, accompanied by œdema and infiltration of the orbital tissues. On the other hand, there is practically no evidence in favour of the theory that the condition is due to dilatation of the orbital veins or to contraction of the involuntary orbital muscle fibres. Inflammations and tumours of the orbit and cavernous sinus thrombosis have to be considered also as causes of proptosis.

Von Graefe's sign in Graves's disease consists in failure of the upper lid to follow the eye on looking down. Dalrymple's sign is a retraction of the upper lid, giving a staring and frightened appearance, and is probably due to a contraction of

Müller's muscle. Stellwag's sign is marked infrequency and incompleteness of the blinking reflex. A widely open staring eye may result from any irritative lesion of the cervical sympathetic. One of the earliest signs of Graves's disease may be a slight elevation of one lid. The patient complains that lately one eye seems bigger than the other. There may be no other evident signs, then later the other eye may be similarly affected, and it may be many months before any other more definite signs of the disease become apparent.

A slight inequality of the palpebral fissures may be an early sign of a seventh nerve lesion, as also may be inequality of blinking, the natural blinking of the affected side being less marked and less frequent than on the sound side.

In those conditions in which there is a diminution of orbital capacity (oxycephaly, endotheliomata of the orbit, osteomata *et cetera*) the signs in the optic disk are characteristic: optic atrophy from direct pressure on the nerve on the side of the lesion, with papillœdema on the opposite side, due to increased intracranial pressure. A tumour of the undersurface of the frontal lobe may produce a similar combination of signs.

Fluttering of the lids may be a habit found in nervous people; but it is also one of the remarkable after-effects of *encephalitis lethargica* with Parkinsonism. In the oculogyric crises of this disease the lids may be widely opened if the eyes are turned upwards, and as a rule the attack does not pass off until sleep is induced. Firmly closed lids, which the patient is unable to open, are another phenomenon seen in certain forms of oculogyric crises.

Jaw-winking is a phenomenon in which the eye opens widely as the mouth is opened or the jaw moved laterally, and is probably due to peculiarities in nerve communication. Some abnormal associations are observed between the movements of the eyes and the lids, and are probably due to connexions between the nuclei of the third, fourth and sixth cranial nerves and the nucleus of the seventh. In certain cases of paralysis of the external rectus, thought to be produced by birth injuries, ptosis occurs on adduction and the eye opens on attempted abduction of the eye.

As regards affection of the upper divisions of the trigeminal nerve the commonest is perhaps *herpes ophthalmicus*. In this the lesion is in the Gasserian ganglion, the ciliary ganglion or in the trunk of the nerve itself. Going hand in hand there are sometimes a paresis of the facial nerve, with inability to close the eye, and ectropion of the lower lid, due partly to the inflammatory process and partly to the paresis of the *orbicularis oculi*. We know that there are often connexions between the lachrymal branch of the fifth and the temporo-zygomatic branches of the seventh. The explanation may be that these fibres from the fifth are motor nerves and have passed through the site of the lesion, and in doing so have become implicated in the inflammatory process.

Reports of Cases.

PATHOLOGICAL REPORTS FROM THE CHILDREN'S HOSPITAL, MELBOURNE.

By REGINALD WEBSTER, M.D., D.Sc.,
Pathologist to the Children's Hospital, Melbourne.

VI. TUBERCULOUS ULCERATION OF THE INTESTINE.

SPECIMENS illustrative of tuberculous ulceration of the intestine are no doubt to be found in most pathological museums; but the segment of small intestine of which the illustration is a photograph was obtained from a child in whom the ulcerative process in the bowel must surely have attained the maximum in extent and severity. The source of the specimen was an autopsy which I carried out on the body of a male child, aged two and a half years; and the findings were as follows.

Emaciation was extreme; tuberculous peritonitis was obvious and extensive. Literally the whole of the mucous membrane of the intestine, from the duodenum to the anus, was affected by tuberculous ulceration. The ulcers ran transversely round the gut, their thickened and raised edges conveying no suggestion of healing. In the colon the lesions were perhaps not so closely set as in the small bowel, but the mucous membrane of the appendix did not escape ulceration. A massive enlargement affected the mesenteric glands, which in general were discrete, firm and pallid, exhibiting points of caseation and miliary tubercles on section. The tracheobronchial glands on either side were enlarged and displayed advanced tuberculous changes; but no focus of infection, of old or recent date, could be detected in the lungs. In the cortex of the left kidney was a caseating focus, one centimetre in diameter, limited by a well-formed wall of granulation tissue. No tuberculous meningitis was present.

A guinea-pig inoculated with an "Antiformin" digest of an excised mesenteric gland provided cultures of the tubercle bacillus; this was characteristically bovine, in its dysgonic growth on the Dorset media and in its lethal effect on a rabbit fourteen days after it was introduced into the animal's circulation by intracardiac injection.

I wish to present this specimen as representing a type of lesion which is occurring with diminishing frequency.

In a study of the relative incidence of human and bovine tuberculous infection affecting children in this State,[1] among 81 children from whom I recovered and differentiated cultures of *Bacillus tuberculosis*, there were 21 bovine strains; and in no instance did I meet a bovine strain outside the group of tissues comprised by the tonsils and the cervical and mesenteric glands. In the cervical gland section, 14 out of 21 strains were bovine, and a high incidence of bovine infection in tuberculous cervical adenitis has been the experience of laboratory workers in all countries. It would appear, therefore, in the absence of routine determinations of the types of tubercle bacilli recovered over a long period of years, that a reliable index of the progress of a community in the elimination of bovine tuberculosis in the human population is to be found in the frequency of occurrence of tuberculous cervical adenitis.

The frequently expressed opinion of clinicians at the Children's Hospital, Melbourne, whose length of experience renders them competent to judge, is that there is now much less tuberculous cervical adenitis and abdominal tuberculosis than there was fifteen or twenty years ago. In a paper read at the Australasian Medical Congress (British Medical Association) held in Melbourne in 1923, Major-General R. M. Downes[2] expressed this opinion with respect to tuberculous cervical adenitis; and I have for long felt convinced that tuberculous ulceration of the intestine and *tabes mesenterica* have receded greatly from the prominent places they formerly held in the *post mortem* room.

In order to test the accuracy of these impressions, I have consulted the annual reports of the hospital for the five-year period 1893-1894 to 1897-1898 inclusive, and that embraced by the years 1931-1932 to 1935-1936. In this interval of thirty-eight years, the figures for tuberculous cervical adenitis and abdominal tuberculosis as causes of admission of in-patients declined from 23·5 per 100 to 5·6 per 1,000.

What, then, is the position as regards the extent of bovine tuberculous infection in the tuberculosis of childhood in this State?

W. J. Penfold[3] investigated 72 cultures from 60 patients, all his material being derived from patients of this hospital and therefore under fourteen years of age, and my own work embraced the study of 86 cultures obtained from 81 individual patients. To the best of my information, there have been no other researches in this field, so that our knowledge regarding the extent of bovine tuberculosis among children in Victoria is limited to the facts elucidated with respect to 141 children and the inferences permissible therefrom. Admittedly, the total of 141 is small; but those familiar with the lengthy bacteriological technique required for the investigation of each specimen will allow that it represents a great deal of work; and I would further submit that it furnishes a reasonably reliable index of the part played by the bovine tubercle bacillus in the tuberculosis of childhood. This claim is based on the general agreement in the findings of Penfold and myself, working quite independently, with an interval of nine years between the studies. Thus, in the 60 cultures of Penfold's group there were 12 bovine and 48 human strains—an incidence of bovine infection of 20%. In my own series of 81 children, none older than fourteen years, and exhibiting varied clinical manifestations of tuberculosis, the number of bovine infections was 21, or 25·9%.

The figure of 20% to 25% may therefore be taken as indicative of the numerical incidence of bovine tuberculous infection in children in this State affected by tuberculosis; but it is not to be interpreted as implying that a similar proportion of tuberculosis mortality and invalidity is due to the bovine bacillus. Of my 21 bovine strains, no less than 14 were recovered from children with tuberculous cervical adenitis; and, subject to correction by those of wider clinical experience, I should say that with competent treatment and careful supervision the outlook for such children was good. The bovine bacillus was responsible for only three fatalities among the 81 children investigated, while, on the other hand, human strains of *Bacillus tuberculosis* determined the deaths of 31 children from disseminated tuberculosis and tuberculous meningitis, and induced crippling lesions in bones and joints in 20 others.

Though it may be said, therefore, that numerically the bovine bacillus accounts for approximately one-fourth of the tuberculosis in childhood in Victoria, this organism is not responsible for anything like one-fourth of the mortality or the disabling invalidity occasioned by the human bacillus.

I would not wish to appear as underrating the importance of the bovine bacillus and the "milk problem"; but it must be viewed in proper perspective. A survey of the whole field of tuberculosis shows the human bacillus as outstandingly the major problem, the bovine the minor and more manageable. The extent to which bovine tuberculous infection in children can be controlled and even eliminated is forcibly shown in the experience of Toronto. R. M. Price,[4] in a study of the types of tubercle bacilli isolated from lesions in children, examined 220 patients ranging in age from five months to twelve years and suffering from some form of tuberculosis. Of these, 190 proved to be infected with the human type, and 30 with the bovine type of tubercle bacillus. Without exception, the children infected with the bovine tubercle bacillus had come from parts of Ontario where pasteurization of milk was not carried out. Inquiry invariably revealed the fact that the child had been fed on raw milk. In the city of Toronto, where pasteurization of milk is compulsory and has been rigidly enforced since 1915, not a single case of bovine infection was encountered in the group of children brought up on the pasteurized milk of the district. As Price puts it, the generation of children brought up on the pasteurized milk of the district had escaped infection with the bovine tubercle bacillus.

Varying views are held regarding the virulence of the bovine type of the tubercle bacillus to the human subject. Knowledge on this question has advanced a long way since Koch issued in 1901 his erroneous dictum that the bovine bacillus was incapable of inducing disease in human beings; but widely divergent opinions are still held regarding its potentialities in this direction. Thus we find that A. S. Griffith,[5] whose vast experience of bovine tuberculosis as it affects human beings cannot be approached by that of any other worker, says, regarding the belief held by many that bovine bacilli are less virulent to man than the human type: "This I have long believed to be a misconception." In this belief he is supported by Bruno Lange, of Berlin.

Griffith points out that while infection by the human type of bacillus is generally by inhalation, the bovine bacillus is restricted to the alimentary portal of entry, and claims experimental evidence to show that of the two routes the alimentary is a much less certain path of infection than the respiratory, and in general leads to less severe effects. A comparison of the two types of tubercle bacillus with respect to virulence is therefore valid only when both have gained access to the bodily tissues by the same route. Griffith holds that when both types effect their entry by the alimentary route, there is little to choose between them, and that the results obtained in England and Scotland in the investigation of meningeal tuberculosis alone disprove the contention that the bovine bacillus is possessed of low pathogenicity for the human subject.

It is interesting to turn aside and examine these results, as they are very different from those that have been obtained in this country, or those that I should anticipate in the event of extension of the local observation. Griffith's figures for England[5] show a 30·1% incidence of bovine infection in meningeal tuberculosis in patients of all ages, and 34·8% in children under four years of age. This "bovine rate" in tuberculous meningitis is based on the findings in 63 differentiated cultures of the tubercle bacillus from meningeal sources. The combined figures of Fraser, Mitchell, Wang, Cumming, Blacklock and Griffith[5] for Scotland show a bovine rate of 13·3% in tuberculous meningitis at all ages and 16·7% in children of under four years. In this series there were 15 differentiated cultures of *Bacillus tuberculosis* of meningeal origin.

In Melbourne I examined strains of *Bacillus tuberculosis* from 27 children who died from tuberculous meningitis, and found that 25 of them were human and two bovine. Only two of these cultures were obtained actually from the cerebro-spinal fluid; but when a child dies from tuberculous meningitis and the human type of bacillus is recovered from the lung tissue, bronchial glands or elsewhere, the possibility that the bovine type is operating in the meningeal phase of the dissemination is too remote for serious consideration. In five cultures of *Bacillus tuberculosis*, obtained from the cerebro-spinal fluid of children and recorded by Penfold,[3] one was a bovine strain and the other four were human. Thus, in Melbourne the bovine tubercle bacillus was encountered only three times in 32 cultures obtained from children who died from tuberculous meningitis.

Returning to the question of the virulence of the bovine tubercle bacillus in the human subject, we find Boyd[6] regarding the bovine bacillus as "not the malignant microbe it is sometimes represented to be". He cites an experience recorded by Holt and Howland which would certainly seem to show that the ingestion of moderate numbers of bovine tubercle bacilli is not necessarily dangerous to man. In a discussion of the milk question, Calmette[7] says that if the often enormous numbers of samples of commercial milk found infected with tubercle bacilli in the large cities are compared with the number of cases of human infection which are certainly or probably of bovine origin, it would appear that the consumption of

this milk is far from being as dangerous as might be feared. The investigations of A. Weber[6] in Germany are adduced by Calmette as throwing much light on the point. These studies had reference to 619 persons, 284 of whom were children and 335 adults. Among them all, 151 children and 200 adults had regularly consumed, for longer or shorter periods, raw milk from cows shown to have tuberculous lesions of the udder. Only two individuals, both of whom were very young and belonged to different families, were found to have tuberculosis of cervical glands of a benign form. In both cases the offending cow had very severe mastitis, involving the whole of the gland. The other individuals who had drunk the same raw milk, among them being eight children, aged from three to eight years, were in apparently perfect health. The conclusion drawn by Weber was that if infection of the human being is to be produced, there must be a frequently repeated intake of a considerable quantity of bovine bacilli. After further discussion, the distinguished Calmette says that, although there is need to combat in a certain measure the "exaggerated fear" of the spread of bovine tuberculosis to man through the bacilli frequently contained in cow's milk, the repeated ingestion of raw milk containing many bacilli should be regarded as dangerous, particularly for young children.

And herein probably lies the explanation of the divergent views on the virulence of the bovine bacillus for man, and the reason for the greater virulence assigned to it by English and Scottish than by American and Continental workers. It would appear to be not a question of virulence only, but of dosage as well, and dosage is a function of the amount of tuberculosis among dairy cattle.

In opening the discussion on A. Stanley Griffith's paper, to which earlier reference has been made, Professor John Fraser quoted Gofton's figures relating to tuberculosis among cattle in Scotland as determined by the abattoirs statistics in the city of Edinburgh. Of 16,249 cattle passed through the city abattoirs for the period 1920-1924, 7,277 (44·8%) were found to be tuberculous. Of these, 48% were affected by general tuberculosis, but only 0·8% showed tuberculosis of the udder. Abattoirs figures in Australia have been examined by Holmes and Robertson.[9] They found many loopholes in the records, and the most satisfactory were those of the Melbourne city abattoirs for the years 1898, 1910 and 1916. In these years a special record was kept to determine the number of cattle affected by tuberculosis in any degree, and not merely the numbers condemned. In the years 1898 and 1910 approximately 4% of the cattle slaughtered showed some degree of tuberculous infection, and for 1916 the figure was 3·5%. After discussion of the various factors vitiating the statistics, Holmes and Robertson conclude that it would be safe to say that approximately 5% of all abattoirs cattle in Victoria are affected with tuberculosis in some degree.

This estimate agrees well with the official figures of the Department of Agriculture relating to tuberculin testing of Victorian cattle as given by H. B. Rudduck.[10] In 1924 the *Cattle Compensation Act and Fund* was brought into operation, and since that date tuberculin testing has been carried out under uniform conditions. In the period 1924-1929, 8,975 cattle were tested, with 642 (or 7·15%) reactors, and the figures for 1929-1933 were 11,520 cattle tested, with 658 (or 5·7%) reactors.

This contrast of the Victorian and Scottish figures relating to the amount of tuberculosis in cattle is not made in any spirit of pharisaic complacency. That there is much less tuberculosis in our stock is our good fortune, and a concomitant of our sunny skies and open and abundant grazing. Naturally, the greater the extent of tuberculosis among dairy cattle, the more frequently will Calmette's condition precedent to the infection of human beings, "the repeated ingestion of raw milk containing many bacilli", be fulfilled; and in those instances of bovine tuberculosis in human beings which have impressed the British workers with the virulence of the bovine bacillus in man, the unfavourable course pursued is most probably referable to large infecting doses.

Although in this State the mortality and morbidity occasioned by the bovine tubercle bacillus do not compare with the ravages of the human type, the activities of the bovine bacillus demand serious attention and call for all possible combative measures in the interests of infants and young children and all "such as have need of milk, and not of strong meat".

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VII. RECUMBENCY CALCULUS.

OF late years, and particularly since 1930, an increasing number of reports have appeared of the occurrence of renal and vesical calculi in patients under treatment for injury to, or disease of, bone and necessarily subjected to prolonged immobilization. Three instances of this complication attendant on protracted recumbency have occurred in the course of the last seven years among children admitted to the Children's Hospital, Melbourne, and subsequently transferred to the Orthopædic Section at Frankston.

Clinical Histories.

CASE I.—The patient from whom the specimen illustrated was obtained was a girl, aged eight years, who was admitted to the Children's Hospital under the care of Dr. J. G. Whitaker, in August, 1930, presenting clinical features strongly suggestive of tuberculous disease of the spine. The rapid development of kyphosis in the mid-thoracic region, followed after a short interval by complete paraplegia, together with unequivocal radiographic findings, established the diagnosis beyond reasonable doubt. The patient was fitted with a double Thomas splint and transferred to Frankston in January, 1931, where she was put into a double spica plaster jacket which enclosed her from the nipple-line to the toes. In her paraplegic condition the child before long developed severe cystitis, but it was not until November 23, 1932, two years and three months after immobilization was initiated, that she experienced the first attack of left-sided pain, which, from its nature and in the light of subsequent events, was undoubtedly that of renal colic. A radiogram made on April 10, 1934, demonstrated a "staghorn" calculus in the left kidney and a large stone in the bladder. The vesical calculus was successfully crushed *per urethram* on May 2, 1934.

In February, 1935, Dr. J. G. Whitaker performed laminectomy and curettage of the dorsal tuberculous abscess, and in the subsequent weeks the patient regained to a slight degree the power of moving her toes. Two months after the operation, however, she died, having been sent back in the interval to the Children's Hospital. The autopsy was carried out by Dr. Ian Wood, who found the anticipated disseminated tuberculosis with meningitis, and secured for the museum the specimen (Figure X).

Before the kidney specimen was mounted a piece of the stone was taken for analysis. It was found to be composed almost entirely of earthy phosphates, with traces of calcium

carbonate, in this respect conforming to type as a calculus laid down during prolonged recumbency.

CASE II.—The second of this group of three patients who developed recumbency calculi was a boy, aged twelve years, who, after three years' immobilization in plaster for tuberculous disease of the right hip joint, developed symptoms and signs referable to the urinary system. The onset of pain, hæmaturia and pyuria led to a series of investigations directed towards the confirmation of the provisional diagnosis of renal tuberculosis; in due course it was established that pus cells were present in the urine from the left ureter but not in that from the right, and that a streptococcal infection of the urinary tract existed. No positive evidence of renal or vesical tuberculosis could be obtained, and on March 28, 1936, Dr. J. G. Whitaker removed a stone from the left ureter.

In the case of this boy estimations of the blood calcium content were carried out in July, 1936, and June, 1937, with readings of 11·0 and 10·6 milligrammes per 100 cubic centimetres on the respective occasions. Four estimations of the blood phosphorus content between July, 1936, and October, 1937, gave uniformly normal results, the lowest figure obtained being 3·4 and the highest 3·6 milligrammes per 100 cubic centimetres of blood.

In June, 1937, the blood phosphatase content was determined as 10·5 units. In the following September and October, readings of 15·4 and 15·2 units were obtained for the blood phosphatase. These figures are an advance on the normal of 6·06 units given for this enzyme, but agree well with those stated as generally obtaining in tuberculous disease of bone.

Analysis of the ureteric calculus showed that it was composed mainly of calcium phosphate, with small amounts of ammonium magnesium phosphate, calcium carbonate and organic matter.

CASE III.—The third child was a boy, aged five years, who was admitted to the Children's Hospital in March, 1929. Tuberculous disease of the spine had so far progressed that a cold abscess, from the contents of which the human type of *Bacillus tuberculosis* was subsequently cultivated, was present in the gluteal region. The boy was sent to the Orthopædic Section at Frankston, where he was placed under the care of Dr. E. E. Price. He appeared to be progressing well until September, 1930, when he suffered an attack of pain, which, with the accompanying tenderness in the loin, was very suggestive of renal colic. This boy died before his renal condition was elucidated, and at the autopsy a calculus was found embedded in the left ureter.

Estimations of the blood calcium content on two occasions resulted in figures of 8·9 and 10·5 milligrammes per 100 cubic centimetres of blood, the blood phosphorus content being determined as 3·8 milligrammes per 100 cubic centimetres of blood.

The details of the biochemical investigations carried out by Miss Dorothy Irving for these two children have been kindly supplied by Dr. Douglas Galbraith from the records of the Children's Hospital Orthopædic Section, Frankston.

Discussion.

The formation of a urinary calculus is no longer to be regarded as a rare, or even uncommon, contingency, attendant upon the prolonged immobilization inseparable from the treatment of disease and injury of bone; and if the factors commonly regarded as operating to induce urinary lithiasis in general are considered, it is not difficult to understand the manner in which the maintenance of the recumbent position for an indefinite period aggravates the action of any or all of them.

Urinary stasis and infection have always been accorded a prominent place in the ætiology of calculus formation, but the formula "stasis and infection" leaves a great deal unexplained. Stasis and infection are undoubtedly important factors, but neither is essential to the formation of a renal calculus. In one group of the subjects of urolithiasis, the disability appears to be referable to an aseptic metabolic disturbance involving an excessive excretion of urinary crystalloids, neither stasis nor infection having any part in the process.

Hyperexcretion.

It is to be remembered that in normal urine the crystalloids are present in a state of apparent supersaturation. That they are not normally deposited is explained by Keyser,[(1)] following Swift-Joly,[(2)] on the theory that the crystalloids are held in a state of dispersion in the urine by adsorption to protective colloids. Brown and Earlam[(3)] discuss this widely supported theory, and point out that its full acceptance involves the scarcely warranted assumption that the less soluble salts deposited from urine exist in urine as such. If salts such as uric acid, calcium oxalate and earthy phosphates of low solubility were found to be in loose chemical combination with other substances, thus forming complex salts of adequate solubility, the excretion in a clear urine of apparently excessive quantities of sparingly soluble salts could be explained much more simply than by the colloid adsorption theory.

Whatever may prove to be the explanation of the process by which much greater quantities of the less soluble salts are held in solution in urine than will dissolve in an equivalent quantity of water, it is certain that in some instances this mechanism breaks down, and that one cause of the collapse is hyperexcretion of urinary crystalloids, apart altogether from stasis or infection.

A reasonable claim for the recognition of hyperexcretory calculosis as a clinical entity can be based on chemical studies of calculi placed against the concomitant blood chemistry in subjects who form calculi in clear urine.

An outstanding instance of urinary lithiasis attributable to hyperexcretion is that associated with hyperparathyreoidism. Higgins and Schlumberger[(4)] state that in numerous cases renal colic has been the presenting symptom leading to the diagnosis of hyperparathyreoidism, and quote Allbright and Blomberg[(5)] as reporting on 23 patients, in whom hyperparathyreoidism was established; of the 23 no less than 15 were shown by radiological examination to have renal calculi.

If it is granted that hypercalcæmia is a factor of importance in the ætiology of renal calculi in general, there are good grounds for assigning it to a part in the formation of immobilization calculi in particular. Such calculi are almost invariably composed of calcium phosphate, and it would seem that they must be related to the demineralization of the bones which occurs during prolonged immobilization and muscular inactivity. Radiological findings have demonstrated the degree of decalcification of bone which may be brought about by complete immobilization for a long time. Further, in severe bone injury and chronic diseases of bone, such as tuberculosis, chronic osteomyelitis and osteoarthritis, the osseous destruction and reconstruction lead to an increase in the calcium content of the blood, which has been demonstrated on many occasions.[(6)] It will have been noted that in two of the three children reported as subjects of recumbency calculus there was no significant departure from the normal in the figures obtained for the blood calcium and phosphorus. In the case of the other child no observations of this nature appear to have been made.

Stasis and Infection.

It is probably very seldom that urinary stasis alone initiates calculus formation, but stasis is of importance in that it does invite and maintain infection. Many regard infection as the chief among the group of ætiological agents implicated in the production of urinary calculi, although none denies the fact that such calculi may form in the absence of infection.

E. C. Rosenow,[(7)] in conjunction with J. G. Meisser, has adduced experimental evidence that the infection may be by a specific calculus-inducing organism, their work being along the lines on which Rosenow has based his well-known doctrine of the elective localization of streptococci. But in patients with spinal injury or disease, such as was present in the child from whom the specimen illustrated was secured, the urinary tract infection is most probably entirely non-specific, any bacterial infection being likely to result in deposition of crystals when the physicochemical state of the urine is favourable. The inflammatory products excited probably operate by upsetting the delicate balance in which the crystalloids are held adsorbed

to their "protective colloids", if this theory is accepted; or, as Brown and Earlam[6] suggest, they may operate by determining alterations in surface tension in urine on the verge of throwing down a deposit.

Among the bacteria which are prone to infect the urinary tract in the circumstances under consideration, the urea-splitting microorganisms take pride of place in accelerating the growth of urinary calculi. Of the urea-splitting bacteria, *Bacillus proteus ammoniæ* is a well-known identity; but it is perhaps not generally realized that the staphylococci, particularly the ubiquitous *Staphylococcus albus*, play such a prominent rôle as was shown by Earlam,[7] who found about 40% of strains of *Staphylococcus albus* examined by him to possess urea-splitting properties. No great imagination is required to appreciate the manner in which the elaboration of ammonia in the urinary tract, by rendering the urine alkaline and provoking the deposition of triple and earthy phosphates, accelerates the growth of calculi.

The *modus operandi* of prolonged immobilization in conducing to renal stasis, which in turn predisposes to infection, has been most clearly expounded by Brown and Earlam.[6] In a comprehensive article on the general question of urinary lithiasis and the special liability to calculus formation of patients requiring lengthy orthopædic treatment, these authors point out that in an individual subjected to prolonged immobilization in the dorsal decubitus the minor renal calyces occupy the most dependent position, and that the renal pelvis is drained at its highest point. In the majority of instances no harm is done if infection is not present, the physical condition of the urine being such that crystals are not deposited. But in a patient in whom deposition of crystals occasionally occurs, and in whom crystals would normally pass from time to time, stasis in the minor calyces might well be the determining factor leading to deposition of crystals and the initiation of a calculus.

Brown and Earlam are careful to point out that the renal pelvis is not to be considered as an inert sac from which urine escapes by gravity, the calyces and pelvis being subject to regular peristalsis. Possibly it is interference with the reflex arc, upon the integrity of which such peristalsis depends, that accounts for the special predisposition of patients immobilized for spinal injury or disease to develop renal calculi. In a patient such as the first of the three children here described, derangement of the innervation of the entire upper part of the urinary tract works towards the same end as the immobilization in the dorsal position, namely, to promote stasis, upon which infection is ever ready to attend.

The Nutritional Factor.

Evidence that nutritional deficiency, particularly lack of vitamin *A*, should be included among the conditions predisposing to urinary lithiasis, has been brought forward by C. C. Higgins,[8] who showed that urinary calculi developed in albino rats sustained on a diet deficient in vitamin *A*. The development of alkalinuria, and a modification of the epithelium of the urinary tract, by which it became stratified or keratinized, were constant observations in the laboratory animals. Infection of the urinary tract was a frequent occurrence in the later stages of the experiments; the calculi were composed chiefly of calcium phosphate. Higgins further found that the addition of vitamin *A* to the dietary caused disintegration and solution of the calculi experimentally produced in rats, and concluded that the chemical conditions necessary for the formation of calculi were induced by vitamin *A* deficiency.

Clinically, Higgins found that a high vitamin "acid ash" diet induced a decrease in size or total disappearance of renal calculi in patients who had refused operation or in whom operation was contraindicated. In 18 such individuals the calculi had undergone solution, according to radiological evidence.

If a nutritional factor is admitted as one of the ætiological agents in urinary lithiasis, it can be readily appreciated that prolonged immobilization and total restriction of muscular activity, by the entailed lack of appetite, would bring it into operation.

Conclusion.

This brief discussion, evoked by the contemplation of a museum specimen, makes no claim to be considered a complete review of the subject of immobilization calculus, but serves to place on record three further examples of a clinical entity of immediate concern to orthopædic surgeons.

Acknowledgements.

I have to thank Dr. Douglas Galbraith, of the Children's Hospital Orthopædic Section, Frankston, for kindly supplying details of the biochemical investigations carried out in Cases II and III by Miss Dorothy Irving.

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VIII. Tuberculous Dactylitis.

Tuberculous dactylitis is a manifestation of osseous tuberculosis which, considered either from the clinical or the pathological aspect, presents features of interest peculiar to itself. The accompanying example of the condition (Figure XI) from the pathological museum of the Children's Hospital, Melbourne, has induced some reflections on the general question of bone tuberculosis in children, and some recollections regarding tuberculous dactylitis in particular.

The patient from whom this specimen was obtained was a little boy, three years of age, who attended the Children's Hospital as an out-patient in the clinic of Dr. H. Douglas Stephens for many months in the year 1917, suffering in the first instance from bilateral tuberculous dactylitis. Tuberculous disease of the left elbow joint and tuberculous mastoiditis supervened, and after a protracted illness the child died in an emaciated condition on January 14, 1918.

The autopsy notes record dactylitis affecting all the fingers except the thumb and little fingers of both hands, indurated, fusiform swellings and multiple sinuses being conspicuous in the diseased digits.

A sinus led into the cavity of the left elbow joint, where the trochlear surface of the humerus was found to be devoid of articular cartilage, and covered with granulation tissue. The greater part of the olecranon process of the ulna, having undergone necrosis, had been curetted away, and granulation tissue replaced the articular cartilage of the head of the radius.

From within the cranium it was determined that extensive necrosis affected the petrous portion of the right temporal bone, the clinically evident mastoiditis conveying an inadequate impression of the extent of the tuberculous process in this situation. Replacing the normal cellular structure of the mastoid process was a single large cavity, containing purulent material in which calcareous spicules could be distinguished, and lined irregularly by granulation tissue.

Enlarged and caseating glands were present on either side of the trachea. A few cheesy, non-softened patches, with outlying tubercles, were present in the apical region

of the left lung; but the only description applicable to the upper lobe of the right lung was that of tuberculous lobar pneumonia. The whole lobe displayed tuberculous consolidation, being uniformly caseated, with no softening or cavitation.

A sowing of miliary tubercles was discernible in the liver and spleen, obviously a terminal hæmatogenous dissemination; but it was noteworthy that no evidence of tuberculous infection appeared in the intestinal mucous membrane, peritoneum or mesenteric glands.

Such findings afforded a strong presumption of infection by the human type of *Bacillus tuberculosis*; but this had already been established prior to the child's death by a culture which I shall always remember. Its effect was to make me feel at the time that I would never again presume to forecast the result of an attempted cultivation of the tubercle bacillus. No one could have taken an optimistic view of the prospect of cultivating tubercle bacilli from the specimen which was sent to me as having been obtained from one of the sinuses of the tuberculous dactylitis. "Two drops of water tinged with hæmoglobin" conveys an accurate idea of its naked-eye characters, added to which very few cells and no microorganisms could be detected on microscopic examination. Perfunctorily, and, it must be confessed, somewhat irritated by the apparent futility of the examination I had been asked to undertake, I rubbed all I could gather of the material into the surface of some Dorset glycerin-egg medium, sealed the tube in which it was contained, consigned it to the incubator, and forgot about it. Three months later I found this tube in the recesses of the incubator, with the surface of the medium covered by a wrinkled, verrucose, pigmented growth, which was soon established by microscopic examination and by introduction of a portion into the circulation of a rabbit, as that of the human type of *Bacillus tuberculosis*.

Tuberculosis of the metacarpals, metatarsals and phalanges is distinguished by a degree of periosteal reaction which is not observed in tuberculous infection of other bones. It may be said that with the exception of tuberculous dactylitis, thickening of the bone does not occur in osseous tuberculosis. New bone formation of any extent in osteitis affecting the long bones is strong presumptive evidence that the condition is referable to a chronic infection other than tuberculosis, such as an indolent pyogenic or a syphilitic process.

Those alumni of the medical school of the University of Melbourne who were grounded in the principles of pathology by the late Sir Harry Allen, will remember with what clarity and power he expounded the fundamental difference between tuberculous and syphilitic lesions of bone: the rarefying quality of the tuberculous process and the proliferative reaction excited by syphilis.

In tuberculosis of the "short-long" bones, the metacarpals, metatarsals and phalanges, infection is usually via the nutrient artery, with carious effect on the cancellous tissue. At the same time, reparative activities on the part of the periosteum lead to the deposition of newly-formed subperiosteal bone, so that the digit is felt to be expanded. For a time the diaphyseal expansion may be the only sign present, but eventually the finger becomes more swollen and painful, the skin shiny and smooth, and the new subperiosteal bone giving way before the advance of the destructive process from within, a sinus is formed leading down to the carious centre of the bone.

It is the unusual degree of periosteal reaction observed in tuberculous dactylitis which, particularly in the stage of diaphyseal expansion, conveys such a strong impression of syphilis. There is text-book justification for the statement that the differentiation between tuberculous and syphilitic dactylitis is generally difficult and sometimes impossible. A radiogram may help; but, on the other hand, it may influence the diagnosis erroneously towards syphilis. This occurred in the case of a child whom I shall always remember. He was aged seventeen months, and exhibited osteitis affecting the fifth metacarpal bone and all the proximal phalanges of the right hand, and the fifth metacarpal, the middle phalanx of the little finger, and the proximal phalanges of the middle, ring and little fingers of the left hand. An illegitimate child, he was taken into the care of his foster-mother from the Neglected Children's Department when five weeks old, so that no family history was obtainable.

At a meeting of the Melbourne Pædiatric Society, held on September 14, 1921, this child was presented, and a radiogram was exhibited. In the ensuing discussion, although there was some difference of opinion, the majority of those present, influenced no doubt by the radiogram and the importance attached to it by one of the senior members of the honorary surgical staff, accepted the diagnosis of syphilis. On the following day Dr. H. Boyd Graham administered an anæsthetic in order that I might explore the affected fingers by aspiration. From one of the phalanges I withdrew a bead of purulent material, a quantity so small that it was deemed advisable to emulsify it in saline solution immediately and inject the emulsion into a guinea-pig without preliminary examination. After the lapse of eight weeks the animal died from widespread tuberculosis. In the meantime a negative finding had been returned with respect to serological evidence of syphilis.

I have consulted the clinical records of five children affected by tuberculous dactylitis, whom for some feature or another I have had occasion to remember. The oldest of the group was three and a half years of age; the youngest, seventeen months. The diagnosis of tuberculous dactylitis was established in three of them by cultivation of *Bacillus tuberculosis*, either directly or with a guinea-pig as intermediary between the tissue and the culture tube. In the other two, diagnosis rested upon the detection of tubercle bacilli in a smear preparation of the products of curettage and histological section of an amputated toe respectively.

Of the cultures of *Bacillus tuberculosis* recovered from three of these children, two were established as of the human type. The mother of the third child was a subject of pulmonary tuberculosis, this fact justifying the presumption that the tuberculous dactylitis in the child was also attributable to the human rather than the bovine type of *Bacillus tuberculosis*. In the remaining two children no cultures were obtained, and no definite history of contact with phthisis was elicited.

This raises the vexed question of the relative incidence of human and bovine infection in bone and joint tuberculosis in childhood. There is a widespread impression that the bovine bacillus plays the major part in tuberculosis of the bones and joints in childhood, and statements to this effect still appear in text-books. For my own part, I am convinced that as the infective agent in osseous tuberculosis in the human subject, the human type of bacillus is *facile princeps*.

During his long association with the Children's Hospital, Melbourne, the late Dr. A. Jeffreys Wood consistently taught that patient inquiry would establish contact with pulmonary tuberculosis in the great majority of children affected by tuberculosis of bones and joints; and having satisfied himself on clinical grounds that such lesions were of human origin, he was not influenced by contemporary text-book dogma, which so glorified the bovine bacillus in relation to arthrosteal tuberculosis.

In all probability the bovine bacillus usurped the lead in tuberculosis of bones and joints as the result of Fraser's early work[1] in Edinburgh (1912). Professor Fraser's results were startling, not to say alarming, and showed that of 67 children, under twelve years of age, suffering from some form of bone and joint tuberculosis, 41 (or 61·2%) were infected with bovine bacilli, 23 with human bacilli, and three with "mixtures of the two types".

This high percentage of bovine infections in bone and joint tuberculosis was not confirmed in the results obtained by A. S. Griffith[2] (1916) in a series of 18 cases from Edinburgh, which showed a bovine incidence of 27·7%—very little higher than that for children under ten years of age in England and Wales.

In 1928 A. S. Griffith published a comprehensive review of 598 cases of bone and joint tuberculosis in Great Britain, in which the type of infecting bacillus had been determined. The examinations had been made by the royal commission, Eastwood and F. Griffith[3] and the author himself. In this large series the bovine bacillus was implicated in 20·5% of the total, the human bacillus being responsible for the

remainder. In children under the age of five years the proportion of bovine infections was 32·8%; in children, aged from five to ten years, 24·5%; in subsequent age-groups the incidence of bovine infections fell rapidly, and no patient over twenty-three years of age was found to harbour the bovine bacillus.

At a later date (1932) Griffith[a] showed that in 520 cultures of *Bacillus tuberculosis* obtained from patients affected by tuberculosis of bones or joints in England and Wales, and differentiated as to type, the proportion of bovine strains was 18% for the whole series, embracing all ages, and 27·3% in the age-group under five years, this group being comprised of 88 patients.

In discussing these figures Griffith commented on the prevalence of the statement that bone and joint tuberculosis in children was generally caused by bovine bacilli. He pointed out that in England the human bacillus was responsible for the greater proportion of the tuberculous infections of bones and joints, causing almost three-fourths in children under five years of age and over four-fifths in persons at all ages.

Thus for England the bovine bacillus is relegated to a 20% to 25% incidence in tuberculosis of bones and joints. The rate is much higher for Scotland, and indeed in all manifestations of tuberculosis the incidence of bovine infection is higher for Scotland than for England. The combined figures of Fraser, Wang, Munro, Cumming, Blacklock and Griffith[a] for bone and joint tuberculosis in Scotland, based on 196 differentiated cultures, show a bovine incidence of 42·8% for all ages and of 60·5% for children under five years of age.

Among 31 subjects of bone and joint tuberculosis investigated in Melbourne by W. J. Penfold[a] and 27 investigated by myself,[a] not a single instance of bovine infection occurred. In my own series ten were children under five years of age, the first five years of life being the period of maximum exposure to bovine infection. It would be unsound, of course, to draw a general conclusion regarding the amount of bone and joint tuberculosis occasioned by the bovine tubercle bacillus in Australia from the relatively small number of cases in which the necessary bacteriological examinations have been made; but the findings certainly suggest that tuberculosis of bones and joints among children in this country is to be traced much more frequently to human than to bovine sources of infection.

It is very desirable that the bacteriological determinations of the types of tubercle bacilli prevailing in Australia should be extended, and at the time of writing further work on this question is being initiated under the auspices of the National Health and Medical Research Council.

Just as the Scottish figures relating to the activities of the bovine tubercle bacillus in bone and joint tuberculosis are higher than those for England, and as within Scotland the rate of infection of the bovine type in the south-west is greater than that for Edinburgh, so in Australia it might well be found that the amount of bone and joint tuberculosis attributable to the bovine bacillus is very much less than in either England or Scotland.

At all events, we must make our own survey and supplement by a much larger number of differential bacteriological examinations the work already done, which suggests that the bovine bacillus, so far from playing the leading rôle, has but a minor part in the tragedy of arthrosteal tuberculosis as witnessed in this country.

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UNUNITED FRACTURE OF THE FOREARM.

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A SHIPWRIGHT, Mr. G.M., aged fifty years, was noticed by me during a routine inspection at the dockyard surgery, Garden Island, Sydney, in January, 1938.

The case is considered worthy of record as a remarkable example of the influence of mind over matter (the patient deserves all the credit for the result achieved), and also as a perfect example of Nature's wonderful adaptability.

FIGURE I.

The accident was caused by a fall from a five-foot fence nineteen years ago; but in avoiding a child seated on the ground he fell awkwardly upon the left arm and sustained a simple fracture of both bones of the left forearm about its middle. He was removed to hospital, where the bones were set and the forearm placed in plaster, which was not removed until a period of three months had

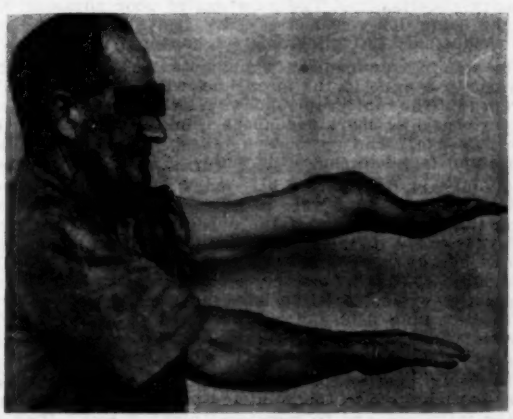

FIGURE II.

elapsed. On examination it was then found that only fibrous union had taken place. The patient was then transferred to another hospital, where plating was resorted to. In all, three operations were performed, the third for the removal of the plates and screws. It will be noticed in Figures III and IV that one screw has not been removed; but this does not affect him in any way.

In his own words the patient states: "After eleven months I got fed up." He returned to work, gradually forced himself to use the limb, and today is employed in doing the heavy work of a shipwright, but suffers no inconvenience.

As may be seen (Figures I and II), there is a pronounced deformity of the left forearm; but the muscular development of the lower arm is excellent. When the patient is using the arm for heavy work the strongly contracted muscles act as a splint, preventing any movement at the false joint; in fact, the power, as far as can be ascertained, is almost equal in both limbs.

I have to thank Surgeon-Captain L. Darby, R.A.N., for permission to report this case, and also Leading Sick-Berth Attendant E. R. Barham and Sick-Berth Attendant Shaw for the radiograph and prints.

A CASE OF ACUTE TUBERCULO-SILICOSIS.

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IN a paper recently presented at the fifth session of the Australasian Medical Congress at Adelaide,[a] the writer drew attention to coarse and fine radiological types of silicosis among metal miners and the apparent influence of infection on the development of the former type. Certain statistical evidence suggests that this type is more rapid in evolution than the fine type. The case described below, which has since come under notice, illustrates this point in an unusually striking manner.

A.J., an Englishman, was examined at the Commonwealth Health Laboratory, Kalgoorlie, as an applicant for employment in the mining industry, in December, 1930. His age at that time was forty years, and he stated that he had worked mainly as a railway employee in non-dusty occupations, except for four years' active service in the Great War and one year underground in a gold mine. He denied having been gassed on service. His previous history was normal.

Clinical and radiographic examination revealed no pulmonary abnormality. The man was of poor physique, his height being 159 centimetres (five feet six inches), and his weight only 53·1 kilograms (eight stone six pounds).

He was reexamined on January 4, 1935, not having worked in a mine in the meantime, with the same result, except that the radiograph showed a slight general increase in peribronchial markings about commensurate with the subject's age. The radiograph taken in 1930 was rather dense and failed to show this feature.

On July 14, 1936, after one year's work on a surface occupation in mining this man was reexamined and an early tuberculous lesion of the upper part of the left lung area was noted in the radiograph; but it was not accompanied by any symptoms or clinical signs (Figure I). On September 29, 1937, however, a radiograph of the thorax showed an extensive lesion affecting the upper two-thirds of the left lung field and a generalized mottling of early coarse type affecting the remainder of the left and the whole of the right lung fields (Figure II).

On being questioned, the subject stated that he felt well, but admitted to coughing and voiding a little sputum in the mornings, and to occasional night sweats. Hæmoptysis was denied. There was no loss of weight or dyspnœa on exertion. The whole of the upper part of the left lung area was dull to percussion, and examination with the stethoscope revealed diminished air entry in the upper half of the left side of the chest, with a few faint crepitations. Sputum was found to contain numerous *Mycobacteria tuberculosis*.

The writer's experience of industrial pulmonary disease has extended over fifteen years, and cases of rapidly developing silicosis among workers after exposure to mine dust for periods of five years or more have been seen occasionally; but this case is of extreme acuteness. There is no doubt in the writer's mind of the silicotic nature of the development in the right lung and lower part of the left lung.

The relationship between tuberculous infection and the presence in the lungs of fine siliceous dust is imperfectly understood even today; but in the case described it is obvious that the supervention of infection has resulted in the development of a silicotic process at a time when radiographic examination of the lungs of a normal person would show no effects of dust inhalation.

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Reviews.

URINALYSIS.

THE clinical importance of examination of the urine has been recognized from the earliest periods of medical history. Dr. R. A. Kilduffe's manual of clinical urinalysis contains a wealth of information of equal value to the clinician and the pathologist.[1] The clinician will appreciate the author's discussion of the interpretation and relative value of the tests described. The pathologist will welcome the clear description of the different tests and the many practical hints given, both with regard to their performance and to the pitfalls into which they may lead.

The bulk of the book is devoted to the chemical examination of the urine and of urinary deposits and concretions. The discussion of the various renal and other tests of function is particularly useful. The author interprets his subject broadly and does not hesitate to describe in detail such other examinations as may be necessary for a proper assessment of the significance of the findings in the urine. Thus the glucose tolerance test is described, although it is mainly concerned with analyses of the blood. Indeed, throughout the book the author emphasizes the importance of considering together with tests of the urine such other cognate information as may be available.

A considerable proportion of the section on urinary deposits is devoted to their morphology. The Addis and the Exton quantitative sediment counts are discussed at length.

There is a short section devoted to the bacteriology of the urine and to urinary tests for the diagnosis of pregnancy. The apparatus and reagents for the tests described, with details of preparation, are enumerated in the last section. There is a comprehensive index.

The development in recent years of easy and rapid methods for the analysis of blood has tended to overshadow the importance of quantitative examination of the urine. Yet the latter is necessary for many purposes. It is usually a simple matter to obtain a specimen of blood suitable for analysis, but useful quantitative information can often be obtained from the urine only through that bugbear of the nurse and the clinician, the twenty-four hours' specimen.

We hope that Dr. Kilduffe's book will be widely read by members of the profession and that it will stimulate them to make fuller use of the information which can be obtained from the examination of the urine.

[1] "Clinical Urinalysis and its Interpretation", by R. A. Kilduffe, A.M., M.D., F.A.S.C.P.; 1937. Philadelphia: F. A. Davis Company. Demy 8vo, pp. 435, with 40 illustrations. Price: $4.00 net.

The Medical Journal of Australia

SATURDAY, JULY 9, 1938.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

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NATIONAL HEALTH INSURANCE.

MEDICAL PRACTITIONERS throughout Australia have expressed their disapproval of the National Health and Pensions Insurance Bill. They have criticized and condemned the scheme and generally have declared that they will have none of it. In other circumstances, in the face of such opposition from the medical profession, the Bill might have been held up for the time being; but there were political reasons why the Government desired to expedite its passage. It has now been approved by both Houses, and its provisions will be enforced after January 1, 1939. The possible effects of the scheme have been critically examined from almost every angle, and it is not our intention to discuss them further here. As regards what has passed, we wish merely to say that the Federal Council seems to have been misled by the acceptance of some of the Government's figures, notably the much debated "3·2". It is unfortunate that the Federal Council itself had no means of showing that these figures were incorrect. Such a predicament must be avoided in any future negotiations. It can be avoided if every member of the Association in Australia gives his assistance. It is not sufficient to say that the scheme is no good. There must be reasons, acceptable to a judicial body as well as to the profession, for its modification or rejection. The Government has promised a Royal Commission to inquire into the medical provisions of the Bill. The profession must have its case prepared for this. It seems unlikely that there will be the apathy and the tendency to leave it to the other fellow that were in evidence during the few years prior to the preparation of this Bill.

If the case for the profession is to be properly presented, it will be necessary for Branch councils to collect all relevant information from their members. In order to facilitate the correlation of such information the Federal Council has drawn up a *questionnaire*, a copy of which will be sent to every member of the Association in Australia. In their replies members must not attempt to make out a special case or withhold information; they must be frank and honest; any departure from these principles can only harm their cause. When the members of the New South Wales Branch were presented with a *questionnaire* last year, many of them objected to answering, as the forms were numbered so as to make it possible for the Branch council to establish the identity, if necessary, of any who responded. There must be no refusal to reply on this occasion. Obviously it is useless to present information that cannot be verified; therefore there must be some means of identifying the person who supplies the information. If the majority of members do not reply, it might be said that only those replied who thought their answers would assist the profession's argument.

One thing of the many that have not yet been made clear is the loss in private practice that is likely to occur if the national health insurance scheme becomes effective in its present form. Many statements and expressions of opinion have been made; but something more than these will be required. Information concerning this loss of private practice, supported by authentic figures that can be readily verified, is vital to the profession's cause. Its importance as a basis of argument for a

higher capitation fee is paramount. Actuarial advice in this, as in other matters, will be necessary. And this brings us to a consideration of the cost. Members will be asked to subscribe to a fund from which legal and actuarial expenses *et cetera* will be paid. Legal expenses will be high, as advice will be frequently required and counsel will be needed to present the case to the Royal Commission and to continue attending to the profession's interests for perhaps many weeks while evidence is being taken. There must also be provision for the reimbursement of members who are compelled to lose income and are put to expense by travelling and remaining absent from their practices while attending meetings or giving evidence. The proposed fund will probably be required for other purposes for many years to come. For example: conditions will be periodically reviewed, and at these times legal and actuarial advice will again be needed and other expenses will arise.

While awaiting developments our readers are urged to continue to utilize the correspondence columns of this journal for expressing their views and offering suggestions on national health insurance. This is perhaps the best means of disseminating information. It is indeed a man's duty at this time to make his opinions known, if he thinks that they may be of value to his fellows.

Current Comment.

SODIUM THIOSULPHATE.

SODIUM thiosulphate (or hyposulphite) has won a good reputation in the treatment of poisoning by mercury, bismuth and arsenic. S. Ayres, junior, and N. P. Anderson have made a study of the use of this preparation as an aid to the elimination of arsenic.[1] They state that since its introduction by P. Ravant in 1920 for the treatment of arsenical dermatitis its administration has been a procedure accepted by dermatologists. In 1923 W. L. McBride and C. C. Dennie testified to the value of the treatment, and many observers have proclaimed its ability to shorten the duration and diminish the severity of arsenical eruptions, particularly those following arsphenamine administration.

[1] *The Journal of the American Medical Association*, March 19, 1938.

It has been shown that oral or intravenous exhibition of the drug is followed by a conspicuous and rapid increase in arsenic elimination. This is followed in the course of several weeks by a gradual diminution in the urinary excretion of arsenic, until only traces can be detected or none at all. Some authorities, however, do not accept the soundness of these observations. J. E. Moore stated that he had seen no evidence that the preparation was of any use whatever. M. B. Sulzberger and J. Goodman accepted in 1937 the conclusions of M. R. Mattice and D. Weisman that administration of sodium thiosulphate did not increase the excretion of arsenic, but actually diminished the urinary output of the metal. They stated that the drug might do more harm than good. In view of these conflicting observations and statements, Ayres and Anderson decided that the entire subject needed reappraisal. For some years they had studied the rôle of arsenic as a causal agent in certain integumentary lesions, and they regularly tested the urine for arsenic before and immediately after injection of sodium thiosulphate in every case suspected of being due to arsenic, except those of dermatitis definitely following arsphenamine administration. They freely admit that excretion of arsenic even by clinically normal subjects varies widely from day to day. They likewise agree that the mere discovery of a small quantity of arsenic in the urine does prove that the disorder concerned is due to arsenic. Their communication is presented solely with the object of furnishing actual evidence of the constant and definite action of sodium thiosulphate in effecting increased elimination of arsenic by the urine. When later determinations were made, a definite curve could be plotted which demonstrated the gradual increase in the excretion of arsenic during the continued administration of sodium thiosulphate. This increase was followed by a decrease in the output, which often fell to zero. Ayres and Anderson state that a possible criticism might be made, namely, that only a single determination of the output of arsenic was made before the thiosulphate injection. They point out, however, that the second determination, made immediately after the injection, revealed a greater quantity of arsenic than the first, except in a few cases in which no arsenic at all was discovered.

Ayres and his colleague describe their technique in detail. They state that, with few exceptions, the specimen of urine collected immediately after a single injection showed a definite and sometimes marked increase of arsenic over the first specimen. Some investigators have emphasized that it is necessary to use fresh crystals of the thiosulphate which should be dissolved immediately prior to administration; but Ayres and Anderson are not convinced that such a preparation is better than the ampoules of sodium thiosulphate in solution which they employ. They determined the quantity of arsenic present in the urine of forty-nine patients. The tests were made prior to and immediately after a single injection from an ampoule of a stable solution of ten cubic centimetres of a 10% solution

of sodium thiosulphate. Eight *per centum* of the patients did not show any arsenic in the urine before or after injection, and 12% showed a diminution of output after the injection. In 80% there was increased arsenic excretion. In some cases one hundred times as much was excreted at the second test as at the first. The increase was seldom less than tenfold. In some instances in which subsequent determinations were made during the course of thiosulphate exhibition, there was a further increase in arsenic elimination. In all these cases there then occurred a gradual decline in excretion. Probably this pointed to the elimination of the arsenic which had been stored in the tissues. Ayres and Anderson believe strongly that an increase in the excretion of urinary arsenic generally follows the injection of sodium thiosulphate.

The matter is not solely one of pharmacological interest. In view of the not uncommon occurrence of severe and intractable dermatitis following arsphenamine administration, it is of the highest practical importance, and the investigations of Ayers and Anderson will greatly assist in the final determination of the truth.

COLLATERAL BLOOD SUPPLY TO THE HEART.

INTEREST in the study of the coronary circulation has been stimulated during recent years by the revelations of electrocardiography. In two articles which are published together, discussion centres around the natural and artificial collateral channels of the coronary arterial system. Charles C. Wolferth concerns himself with the possibility of the occurrence of a natural adaptation of the circulation after survival of the patient from the effects of coronary occlusion.[1] The coronary arteries are not end-arteries; experimental work indicates that collateral blood flow is extremely small and insufficient to prevent necrosis or paralysis in an area rendered ischæmic by ligation of a main branch. Slow occlusion, however, may gradually lead to the development of new or the enlargement of old accessory vascular communications. Complete occlusion of both coronary orifices has actually taken place without the occurrence of any signs of myocardial infarction; but it seems probable that the usual source of a collateral circulation is the coronary arteries themselves rather than the Thebesian vessels or those arising from the root of the aorta or from the pericardium. It is unusual, however, to find at autopsy a coronary occlusion with the closure limited to a single artery or branch. This means that the preexisting ischæmic area is made larger by the fresh occlusion and has a correspondingly diminished chance of obtaining a new blood supply from adjacent vessels.

H. Feil and Claude S. Beck report the results which they have obtained from the treatment of sclerosis of the coronary arteries by the grafting of vascularized tissues onto the heart wall.[1] They state that in the case of twenty-five of their patients so treated a sufficiently long interval has elapsed since the operation to permit an evaluation of the clinical results. In the selection of patients for operation the requirements were, first, unequivocal evidence of the existence of coronary sclerosis, secondly, the patients' inability to continue on medical treatment (drugs and rest) with any degree of comfort, and, finally, the absence of circulatory failure. The coexistence of hypertension and *diabetes mellitus* was not considered absolute contraindications to operative interference. Extensive studies on the cardiac function and clinical appearances of the patients were carried out both before and after operation. The operation performed was the so-called Beck procedure, which consists in the grafting of vascularized fat and muscle onto the heart wall. The *pectoralis major* muscle and the mediastinal or omental fat were all used on different patients. The epicardium was roughened and powdered beef bone was placed on the surface of the heart, so that a low-grade inflammatory reaction between the grafts and the muscle might be produced. Drainage was established between the mediastinum and the left pleural cavity, and the patient was nursed in an oxygen tent as a routine measure. The mortality of the first twelve patients before these precautions were taken was 50%; that of the last nine was zero. Thirteen patients were observed over a period of five or more months after the operation. It was found that three patients were freed from pain and that their exercise tolerance was definitely increased. Nine patients still complained of pain, but this was less severe and medication was called for less often, while some increase was evident in exercise tolerance. No patients were unimproved by the operation. Nine patients died, eight of them within one week of the operation.

Feil and Beck believe that these results are encouraging and that they become more so as their experience widens. They believe that the opening of intercoronary communications explains the early improvement noted by many of the patients, which cannot possibly be explained on the basis of additional blood supply from the grafts. A third possible factor may be the interruption of nerve endings beneath the epicardium.

The Beck procedure would appear to be as successful as the pure omental graft advocated by O'Shaugnessy. The clinical field is a small one, as many patients affected with severe angina are already showing other signs of serious cardiac breakdown. It is easy to include examples of functional cardiac pain unless the strictest standards for the diagnosis of coronary sclerosis are applied. The operation is certainly worthy of thorough investigation.

[1] *The Journal of the American Medical Association*, November 27, 1937.

[1] *The Journal of the American Medical Association*, November 27, 1937.

Abstracts from Current Medical Literature.

PHYSIOLOGY.

Speech and Hearing.

PHYLLIS M. TOOKEY KERRIDGE (*Physiological Reviews*, January, 1938) has written an introduction to the study of hearing and speech. Modern science provides many new ways of finding out how vocal sounds are made, heard and understood. Physicists investigate mechanical reproduction of speech; psychologists analyse the sensation of hearing; phoneticians study the elements of language; clinicians examine and describe disorders of speech and hearing. In all these ways our knowledge of the physiology of speech and hearing increases. The author reviews recent work concerning the theory of hearing, dealing with the electrical response of the cochlea, the action potentials of the auditory nerve, and the nervous connexions of the cochlea. With regard to speech, she observes that its mechanism has been restudied recently because better tools are at hand to examine it. The vocal cords have been the subject of intense inspection. They have been looked at directly, by reflection and stereoscopically; they have been photographed in monochrome and in colour, and they have been filmed in action. The result, according to this author, is complication and controversy. Moving X ray pictures of the alterations in shape of that part of the air passages above the vocal cords have been correlated with sound films taken synchronously. The movements of the tongue and lips have been studied by cinematography. The electro-acoustic records of Trendelenburg show the wave form of vowel sounds as they appear from the mouth. Tones corresponding to the supposed characteristic resonance frequencies of vowels have been put together and synthetic vowels produced with remarkable success. Microphones, amplifiers, oscillographs, acoustic filters, sound films, gramophone records and other devices have been brought to the study of the physical characteristics of speech, and have shown the complicated way in which speech is produced, and the elaborate pattern of constantly changing vibration in the air which reaches the ear. There is a large variation in respiratory habit; the carrying power of a voice does not seem to bear any relation to the type of respiration or to the vital capacity of the speaker's lungs. Very little of the sound emitted from the speaker's mouth travels directly to the receiving ear, some authors estimating that as much as 90% of the vibrations which reach the ear have first been reflected from walls, floor or furniture. The author concludes this introductory review by observing that very little is even guessed of the processes in the brain which are essential to appreciation of reception, or of those which initiate the actions of speech or of the connecting links between the two.

Liberation of Acetylcholine.

THE formation of a chemical substance at the terminals of the primary neurones is implied in the theories of humoral transmission, although these structures have not the properties ordinarily associated with secreting organs. Rafael Lorente de Nó (*The American Journal of Physiology*, February, 1938) observes that it has been proposed that the acetylcholine may be derived from the nucleated sole plate, rather than from the endings, and that an analogous source for the substance in a sympathetic ganglion would be the satellite cells, with which the nerve terminals and the dendrites of the ganglion cells seem to be in intimate contact. He has devised experiments to test the latter possibility. The superior cervical sympathetic ganglion and the nodosum ganglion of the vagus were perfused, and the output of acetylcholine was determined with the leech preparation described by Fühner (1918), Minz (1932) and Chang and Gaddum (1933). Four experiments were made, with changes in the technique in each series. All experiments were performed on cats anæsthetized with "Dial". Ganglia prepared with a technique leading to damage of the cells, as revealed by subsequent histological analysis, yielded acetylcholine to a perfusate without the intervention of stimulation; careful technique considerably reduced or prevented this spontaneous release. In successful perfusions the liberation of acetylcholine by preganglionic stimulation was very small. In experiments in which histological analysis failed to reveal signs of damage to the ganglia, a definite relation between the output of acetylcholine and the duration of perfusion was established. At the start of the experiments the amounts of acetylcholine liberated were small, the minimal amount being produced in the second period of stimulation. The amounts increased during the perfusion and decreased again towards the end of the experiment. The author raises the question of whether the liberation of acetylcholine by nerve stimulation is a physiological process or, as has recently been concluded for motor nerves to striated muscles, a pathological process. The large amounts of acetylcholine liberated in imperfect experiments appear to be attributable to injury of the tissues. Physiological transmission through the ganglion may take place with release of much smaller amounts of acetylcholine. However, the author observes that the fact that acetylcholine is released in any amount must indicate that the substance is found to some extent in the normal metabolism of the tissues of the ganglia. He found that release of acetylcholine took place regularly some time after the transmission of impulses had ceased; whether there is any liberation preceding synaptic transmission is still an open question. It cannot be stated whether, under physiological conditions, any amount of acetylcholine diffuses out of the cells; in the author's opinion the evidence indicates the existence of an acetylcholine metabolism in the tissues of the ganglia, and shows that this metabolism is not specific to the synaptic junctions.

Fright and Drug Contractions in Denervated Muscles.

MORRIS B. BENDER (*The American Journal of Physiology*, March, 1938) describes the occurrence of slow, long-lasting contractions in denervated muscles of monkeys in the absence of electrical or direct nerve stimulation. The muscles denervated were those supplied by the facial, oculomotor and trochlear nerves. All operations were carried out with aseptic technique under anæsthesia with "Sodium Amytal" or "Nembutal" administered intraperitoneally. About two weeks after denervation, contraction of the paralytic muscles occurred whenever the monkey was angered or frightened. The animal was frightened by being threatened with objects such as sticks. Monkeys thus frightened ran round their cages dodging the menacing object. About two to three seconds after the threatening had ceased, slow contractions of the paralysed muscles appeared. This "fright reaction" was obtained in every animal tested, so long as the muscles remained denervated. The author states that contractions in denervated muscles were first recognized in 1863. In 1930 Dale and Gaddum, among others, suggested that the contraction was due to the diffusion of acetylcholine, liberated at the nerve endings by the activation of vasodilator nerve fibres. The author found that the contractions in denervated muscles associated with fright could be reproduced by parenteral injections of eserine and acetylcholine. Acetylcholine injected intramuscularly without previous injection of eserine had no effect on denervated muscles. Eserine was injected intramuscularly in doses of 0·05 milligramme or less per kilogram of body weight fifteen minutes before injection of acetylcholine. Eserine alone, in larger dosage, produced diffuse fibrillary twitchings of all normal skeletal muscles, but had no effect on denervated muscles. Visible twitchings in normal muscles were not produced by the small doses used in these experiments. The contractions caused by fright were augmented by previous eserinization. The contractions produced in denervated muscles by fright and those reproduced by acetylcholine could not be elicited when nerve regeneration had occurred. As well as producing contractions in denervated muscles, the injection of acetylcholine caused salivation, chewing and grinding of teeth, slowing of the heart rate, and hypoactivity. Less con-

stantly, lachrymation, blushing of the skin of the face, defæcation, urination and prostration were observed. Occasionally, according to amounts of eserine injected, acetylcholine produced twitchings in normal muscles. The strict parallelism between the contractions obtained with fright and those reproduced by acetylcholine suggested to the author that the fright reaction was due to a substance like acetylcholine which was secreted during fright, the denervated muscles thus acting as an indicator of the presence of acetylcholine in the body. Adrenaline did not produce contractions in denervated muscles; it moreover inhibited the contractions in denervated muscles produced by acetylcholine. Neither stimulation nor section of the sympathetic nerve supply to the muscles in question produced any visible effects on the state of denervated muscles. The author suggests that during fright there occurs a general discharge of the autonomic nervous system, with a secretion not only of a "sympathetic-adrenergic" hormone, but also of a "parasympathetic-cholinergic" substance, acetylcholine. He states that additional observations, in which the monkey, mangabey, baboon and chimpanzee were used, showed that the higher the animal was in the phylogenetic scale, the less conspicuous were the contractions in the denervated muscles induced by fright, or those reproduced by acetylcholine.

BIOLOGICAL CHEMISTRY.

Determination of Sulphanilamide.

E. K. MARSHALL, JUNIOR (*Journal of Biological Chemistry*, December, 1937) has described a method for the quantitative estimation of sulphanilamide and the conjugated compound, acetylsulphanilamide, in blood, urine and other body fluids. The method is based on the diazotization of the sulphanilamide and the subsequent coupling of the diazo compound with dimethyl-α-naphthylamine to form a purplish-red dye which can be estimated by colorimetric comparison. Acetylsulphanilamide is hydrolysed, by being heated in acid solution, to sulphanilamide, which is then determined. The method may be applicable to certain derivatives of sulphanilamide.

Sex Hormones and Menstrual Œdema.

GEORGE W. THORN, KATHERINE R. NELSON AND DORIS W. THORN (*Endocrinology*, February, 1938) have investigated the cause of œdema associated with menstruation. In normal dogs the injection of crystalline preparations of œstrone, progesterone, pregnanediol and testosterone induced the retention of sodium chloride and water. Balance studies in human subjects demonstrated a retention of sodium chloride and water during the intermenstrual as well as the premenstrual phase of the cycle. The onset of menstruation was associated with an increased renal excretion of sodium chloride and water. Normal subjects, on whom no dietary restrictions were imposed, were observed to gain weight during the intermenstrual as well as during the premenstrual phase. An increase in appetite and thirst was commonly noted in the premenstrual period. The increase in the secretion of sex hormones and the increase in appetite and thirst appeared to be contributing factors in the body weight gains which occur in the menstrual cycle.

Black Tongue in Dogs.

C. A. ELVEHJEM, ROBERT J. MADDEN, F. M. STRONG AND D. W. WOOLLEY (*The Journal of Biological Chemistry*, March, 1938) have isolated from liver the factor necessary for the cure and prevention of black tongue, a condition produced in dogs by feeding them on a modified Goldberger diet. This factor has been identified as nicotinic acid amide. Both nicotinic acid and nicotinic acid amide were effective in curing black tongue in dogs and maintaining dogs in a normal condition on this modified Goldberger diet. The authors admit that it is not possible to conclude from the experimental work with dogs that nicotinic acid will prove useful in the treatment of human pellagra. From a consideration of the toxicity of nicotinic acid in the dog and the similarity of man to the dog in the mechanism of detoxication and excretion, it is believed that no difficulty should be encountered in the use of reasonable amounts of nicotinic acid in humans.

Stability of Papilloma Virus Protein.

J. W. BEARD AND RALPH W. G. WYCKOFF (*The Journal of Biological Chemistry*, April, 1938) have made a study of the pH range of stability of the molecules and the infectiousness of solutions of the purified heavy protein isolated by quantity ultracentrifugation from virus-induced warts on cottontail rabbits. It was found that immediate inactivation of the virus occurs at those pH values at which molecules fragment. In weak alkaline solutions there was a gradual loss of virus activity, which was not reflected in observable changes in the molecular sedimentation rates. The observed phenomena were considered to be compatible with the hypothesis that the homogeneous heavy protein is the causal agent of infectious papillomatosis in rabbits.

Action of Insulin on Glycogen Reserves.

EDWARD M. BRIDGE (*Bulletin of the Johns Hopkins Hospital*, April, 1938) has reinvestigated the action of insulin on the normal rabbit under conditions as free as possible from technical sources of error. Glucose-saline solution with or without added insulin was injected continuously into normal unanæsthetized rabbits during a period of six hours. The results were in accord with previous physiological investigations. It was found that insulin did not affect the total amount of glycogen deposited in the liver and muscles as a result of the constant glucose infusion. The predominant effect of insulin was a shift in glycogen deposition from liver to muscle tissue. Injection of glucose alone resulted in a rise in the blood sugar value to a constant level with a slight tendency to a decline during the later hours of the experiment. In contrast with this, under the influence of large doses of insulin the average blood sugar reading rose steadily during the infusion, although the rate of injection remained constant throughout. Estimations of the respiratory quotient offered no evidence in support of the belief that insulin stimulated carbohydrate combustion in the non-diabetic organism. No significant differences as the result of insulin administration were demonstrated in the glucose oxidized, retained or remaining in the body fluids.

Nature of Hæmoglobin in the Red Cell.

GORDON ALBERT ADAMS (*The Biochemical Journal*, April, 1938) has shown that in all species examined red cell suspensions do not exhibit the ultra-violet absorption band in the region of 4,000 to 4,100 Angström units which is characteristic of hæmoglobin and its immediate derivatives. *In vitro* experiments showed that corpuscle stromatin and hæmoglobin could be combined to give an ultra-violet spectrum similar to that of hæmoglobin in the corpuscle. It was postulated that such a combination existed in the corpuscle. The compound was labile and appeared to be a union between stromatin and the globin fraction of the hæmoglobin molecule.

Excretion of Silica.

EARL JUDSON KING AND MURRAY MCGEORGE (*The Biochemical Journal*, February, 1938) have studied the urinary excretion of silica in cats, after administration of various siliceous materials and dusts. Oral administration led in some cases to an increased excretion of silicic acid in the urine. Free silica was attacked to a variable extent, depending on its physical and chemical condition. Several silicates were not absorbed and produced no increase in urinary silica. Some complex silicates appeared to suffer partial decomposition by the hydrochloric acid of the stomach, with partial solution of some of the products in the intestine and an increase in urinary silica. Inhalation experiments with mineral dusts gave inconclusive results, while inhalation of amorphous silica led to increased elimination of silicic acid in the urine.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on April 28, 1938, at the Robert H. Todd Assembly Hall, British Medical Association House, Macquarie Street, Sydney, DR. B. T. EDYE, the President, in the chair.

Ureteral Calculus.

DR. K. H. KIRKLAND read a paper entitled "Ureteral Calculus" (see page 35).

DR. D. G. MAITLAND read a paper entitled "The Radiological Aspect of the Treatment of Ureteric Calculus" (see page 38), and showed a number of lantern slides illustrating the radiographical appearances in ureteral calculus.

DR. E. W. FRECKER spoke from the radiological point of view. He said that the demonstration of a ureteric calculus was comparatively easy, provided the calculus was radio-opaque. The difficulty arose when the calculus was small or radio-translucent. Dr. Frecker then showed a number of slides to illustrate his point. He referred to the varying degrees of radio-opacity of the kidney when "Uroselectan" was used. The kidney substance became more opaque when there was apparent anuria due to the presence of a calculus blocking the ureter. It seemed to him that this temporary arrest of function of one kidney was due more often to back pressure, resulting from blockage of a ureter, than to reflex action. The dye-containing urine was dammed back in the kidney substance and thus failed to appear in the urinary passages, though it rendered the kidney parenchyma more opaque to the X rays.

DR. R. G. S. HARRIS referred to the localization of pain and its interpretation. It had been pointed out by Hunter that the differentiation between colic from a stone in the lower end of the ureter and seminal vesicle colic was often practically impossible. Quite frequently there was no excretion of "Uroselectan" when there was a stone in the pelvis or ureter. He was inclined to interpret this absence of excretion as due to blockage of the ureter itself. Expectant treatment was justified only when there was no dilatation of the ureter and kidney above the site of the stone. If dilatation was present above the stone, active interference was urgently required. This might be either manipulative or operative. Frequently a gross degree of hydronephrosis was found above an impacted calculus, and the question arose whether nephrectomy was indicated. Dr. Harris pointed out that quite often a remarkable degree of involution of the hydronephrosis would occur in patients between the ages of twenty and forty years. He had had a patient with a stone impacted at the uretero-vesical junction, in whom an advanced degree of hydronephrosis and great dilatation of the ureter were present. After cystoscopic manipulation a large catheter was able to be passed. At the time of the meeting it had been in the ureter for three weeks, and retrograde pyelography showed that the kidney had involuted almost to normal, although the stone was still present. If involution did not occur it would be useless to remove the calculus and not the kidney. This was a good test of whether the kidney should be conserved. Expectant treatment depended to some extent on the size of the stone. If the stone was greater in diameter than the calibre of the lower end of the ureter, operation should be performed; if it was not greater, ureteric dilatation and the passage of a catheter should be tried.

Dr. Harris agreed with Dr. Kirkland in his insistence that a "wet" X ray film should accompany to the operating theatre every patient who was to undergo operation for a calculus; he considered this most important. The stone frequently moved or was passed, and it was important that a skiagram should be made a matter of minutes before the operation.

Speaking of the causation of calculi, Dr. Harris referred to hyperparathyreoidism and vitamin *A* deficiency. He suggested that Dr. R. H. Bridge might discuss a recent case in which hyperparathyreoidism was apparently a factor. Dr. Maitland had very rightly pointed out the rather neglected fact that radiologists should confine themselves to reporting shadows seen in X ray films without making a definite diagnosis; they should leave it to the clinician to prove whether the shadows were due to calculi or not. He stressed the necessity of constant centring when further skiagrams were taken, to ascertain whether a shadow had changed its position. Every skiagram should be taken in the same position. Dr. Harris stressed the importance of taking X ray photographs on removal of the catheter after retrograde pyelography, to gauge the emptying time of the kidney. A normal kidney emptied at the rate of one cubic centimetre per minute. Apart from frequently demonstrating calculi that might otherwise be missed, examination in this way demonstrated whether there was any obstruction to the outflow from the renal pelvis.

DR. R. H. BRIDGE spoke of the influence of hyperparathyreoidism on the causation of calculi. He quoted the case of a boy, aged nineteen years, who had been medically attended a number of times for calculi, and in whom the late Dr. S. H. Harris had been interested. Nephrotomy had been performed by another surgeon. When seen by Dr. Bridge the boy had many calculi. A specimen of urine was taken for examination, and Dr. Bridge thought when he saw it that it was loaded with pus. On examination, however, it was found to contain no pus, but a large amount of calcium oxylate. Dr. Bridge then thought that the boy might have some sort of constitutional disturbance. An enormous increase in the blood calcium and the blood phosphorus was found, and a diagnosis of parathyreoid tumour was made. The tumour was removed by Dr. I. D. Miller.

Dr. Bridge considered that there was no condition more puzzling than a stone in the ureter. It could offer a most bizarre presentation. Many people believed that it was the mere presence of a stone in the ureter that produced pain. This was not correct; pain did not occur unless the stone blocked the ureter, so that the urine was dammed back under pressure. Dr. Bridge remembered in his resident days at hospital a large number of otherwise healthy people coming in off the street with violent colic. Morphine was given and the patients recovered, being discharged with a diagnosis of calcium oxylate crystals. He thought that practically every such person with renal colic had a calculus somewhere, no matter what a plain X ray film revealed. The ureters differed in size in different individuals, the intramural portion being very narrow in some; in these a minute stone caused intense pain. Cystoscopic investigation frequently revealed bruising around the ureteral orifices, due to the stone's having forced its way through; this appearance was diagnostic of the condition.

DR. DOUGLAS MILLER elaborated the history of the young man referred to by Dr. Bridge. As it was thought that hyperparathyreoidism affected the bones primarily, he had arranged for a thorough radiological examination, which revealed certain departures from the normal. There was a certain amount of decalcification and very loose trabeculation without definite cyst formation. The interesting feature was that attention had been drawn first to the kidney rather than to the bones. The evidence seemed sufficient to warrant a search for a parathyreoid tumour. None could be felt by external palpation. At operation a wide exposure was made. After a long search, first on the left side and then on the right, a tumour was found nestling in beside the œsophagus posterior to the thyreoid fascia; it was soft, and even then it could not be felt as distinct from surrounding structures. It was of a yellow colour, about the size of the terminal phalanx of the thumb, and derived its blood supply from the artery to the upper pole. It turned out to be a parathyreoid adenoma. After the operation the boy went into a latent tetany lasting a few weeks, and had to have two injections of parathormone. His blood calcium content became stabilized at nine milligrammes per hundred cubic centimetres. Dr.

Miller said that a search of the literature revealed that some cases had occurred in which renal calculi had become fragmented and had been passed, and had failed to reform after the removal of a parathyreoid tumour; it remained to be seen whether this would happen in the case of the boy whose history he had given.

DR. B. T. EDYE, from the chair, thanked both the speakers. He said that the problem discussed was interesting to everybody. He had often been asked to see patients thought to be suffering from intestinal obstruction and who had all the signs of such an obstruction, but who were really suffering from reflex ileus due to ureteric calculus. It was very serious to operate on such patients. Dr. Edye remarked that he had recently been called to the country to see a patient who appeared to be suffering from an obstruction of the colon, but who actually had a calculus in the left kidney. Dr. Edye went on to say that in renal colic the pain was confined almost entirely to the affected side; in other conditions the pain was apt to radiate over the abdomen. Dr. Edye concluded his remarks by saying that in difficult cases an examination of the urine for red blood cells would often help to solve the problem.

Dr. Kirkland, in reply, said that he appreciated Dr. Harris's point about the involution that might take place in hydronephrosis. Obviously the disease was renal, even if the obstruction was ureteral, and it was not worth while to remove the stone alone if the kidney was functionless. No fancy manœuvres were indicated if the kidney was too much damaged. The difficulty was in many cases to get a catheter past the stone; sometimes it was better to relieve the patient of a useless kidney without further ado.

Dr. Maitland, in reply to Dr. Frecker, who had mentioned the fact that in an excretion pyelogram the shadow of the kidneys was much clearer than in a plain skiagram, said that this fact was due to the circulating dye and also to back pressure of the urine in the presence of ureteric calculus, which caused cessation of the glomerular function of the affected kidney. In reply to Dr. Harris, Dr. Maitland spoke of the faculty of involution of the kidneys in normal pregnancy and in pyelitis of pregnancy. The obstruction to the ureters appeared to be at the pelvic brim; sometimes enormous dilatation and considerable delay in excretion occurred, and up to an hour after the injection of "Uroselectan B" often no opaque medium had reached the bladder. Yet even two months after the patient had been delivered, reexamination after intravenous injection of "Uroselectan B" might reveal an almost normal excretion. In subsequent pregnancies the same sequence of events had been noted.

Speaking on the question of the radiologist's leaving the diagnosis to the clinician, Dr. Maitland said that clinically and radiologically a shadow might suggest a ureteric calculus, but absolute proof was necessary by catheterization or by excretion urography.

Speaking of excretion urography in regard to suspected stone, Dr. Maitland said that, in his opinion, it was the method of choice and frequently gave all the information required. Plain radiography was necessary as a preliminary; but some ureteric calculi cast no shadow and therefore would not be apparent in the plain X ray film.

An analogy was Graham's test in biliary calculi, the majority of which cast no shadow; the clinician would be far from satisfied with a plain X ray examination to exclude gall-stones. The excretion method could never replace retrograde pyelography in conditions other than stone; and occasionally, even in the diagnosis of stone, the retrograde method had to be carried out.

A MEETING of the Victorian Branch of the British Medical Association was held on March 2, 1938, at the Medical Society Hall, East Melbourne, DR. J. P. MAJOR, the President, in the chair.

The Management of Facial Injuries.

DR. CHARLES OSBORN read a paper entitled "The Management of Facial Injuries" (see page 41).

PROFESSOR ARTHUR AMIES opened the discussion by observing that Dr. Osborn had given an excellent survey of the common ground of general surgery and dental surgery. It could no longer be said of the dental surgeon that he was a mere tooth carpenter. The dental surgeon was competent to assist in the repair of jaw injuries, and many of these injuries were the particular province of the dental surgeon, though on occasions the general surgeon might have to make an attempt at the work without dental help. In the opinion of Professor Amies, it should be a standing order at the general hospitals that a dental surgeon should be in attendance in the theatre whenever facial injuries were first touched. He quoted an example of the necessity for such an arrangement. After an accident a young lady, whose face was mutilated, was operated on by a general surgeon. The reparative work was well done, and included an extensive repair of the lower lip. At a later date it was discovered that the mandible was fractured in three places, and, owing to difficulty of access, the dental surgeon had to upset the repair of the lower lip. That could have been obviated if the dental surgeon had been present at the previous operation.

It had been refreshing to Professor Amies to hear a general surgeon express his appreciation of interdental wiring. Interdental wiring was well on the way to being widely accepted; it was not unsightly, was easily removed, and avoided the delay necessitated by the preparation of a splint. Black copper cement was the only cement that would hold a metal-cap splint with certainty. Professor Amies expressed the opinion that it was unwise to wire the maxilla to the mandible in cases of horizontal fracture of the maxilla. He also stated that the cap splint should be used for grafting; interdental wiring allowed a very small amount of movement.

Professor Amies emphasized the importance of after-treatment of fracture of the jaw. It amounted to half the treatment, and immobilization was the other half. In discussing after-treatment, Professor Amies recommended constant oral irrigations by means of a mouth retractor, a douche-can and rubber tubing to introduce the irrigating fluid. He deprecated the use of hydrogen peroxide in the mouth, except as a styptic or for diseases due to anaerobic organisms, such as Vincent's. When bone was exposed and infection was present, peroxide seemed to "blow" the infection through the Haversian canals in the bone. Eusol, potassium permanganate, boracic acid lotion, normal saline solution or almost any other solution would do except peroxide of hydrogen. The irrigations should be carried out six times a day.

With reference to the radiography of facial injuries, Professor Amies said that it was necessary to have postero-anterior and right and left lateral exposures, and sometimes an intraoral radiogram. In addition, it was important to make sure of the integrity of the condyles. He agreed with Dr. Osborn's condemnation of four-tail bandages. Dental surgeons liked to leave such bandages on coal-heavers and other manual labourers, who might need the advertisement to their fellows to protect them from further injury.

DR. A. E. COATES agreed with Professor Amies that Dr. Osborn's paper had impinged on the work of the dental profession. At the Royal Melbourne Hospital it was the custom to refer injuries of the jaws to the dental surgeon for treatment. He doubted whether it would not be incongruous to call a dental surgeon to the casualty room or operating theatre in the small hours of the morning to help a junior surgeon repair a wound of the face. In many cases the dentist could not be of much use.

Dr. Coates asked consideration for simpler methods of dealing with some of the facial injuries; medical men had been accustomed to treat some lower jaw fractures more simply than had been implied by Dr. Osborn. Dr. Coates mentioned the use of a plaster cap on the head, in which three collar studs were embedded; a plaster mould over the lower jaw also had studs embedded, and by means of the two sets of studs the mould over the jaw could be hinged up to the plaster cap. That method had sometimes been quite successful.

Dr. Coates said that in the treatment of fractures of the lateral and posterior portions the best method of approach was by the temporal route; in more forward fractures, elevation could be brought about by a sudden whack on a strong instrument passed under the fracture from within the mouth. He realized that the subject was very big and that it was difficult to include everything in Dr. Osborn's paper. He had not referred, for instance, to parotid duct injuries, which were at times very serious in their after-effects. The work traversed by Dr. Osborn was very highly specialized. If good cosmetic results were to be obtained and medico-legal safeguards assured, the work should be placed in the hands of those who could deal with it satisfactorily.

Dr. Coates could not understand why people continued to use compact bone for grafting; the soft cancellous bone of the crest of the ilium was much better than the bone from the edge of the tibia, which resembled a drain-pipe in hardness. Dr. Coates commented on the importance of watching for the late results of motor car accidents. Injury to the spine of a driver should not be overlooked. Sudden impact caused acute flexure of the spine, and compression symptoms might be manifested only as late as six months afterwards.

Dr. Osborn, in reply, said that he had not meant it to be inferred that he advocated the wiring to the mandible of a fractured maxilla at an early stage, though it might be necessary at a later stage. He had omitted reference to the after-treatment of fractures of the jaw only because of the time factor, but quite agreed with Professor Amies about its importance. He was glad to hear Dr. Coates discuss the medico-legal aspect of facial injuries. Australians were far behind other countries in cosmetic surgery; cosmetic surgery was not a pastime, but held considerable prominence at the present time in London and elsewhere. It was a valuable branch of surgery; men and women were obsessed with facial disfigurement, which was a disability in the employment market. Excellent results could be obtained with little danger to the patient and with few medico-legal consequences. There was a field for cosmetic surgeons in the late repair of hare-lip conditions, in which it was often not possible to get satisfactory results from early repair; late repair with good cosmetic results could and should be carried out.

NOMINATIONS AND ELECTIONS.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Brown, Maxwell Mansfield, M.B., B.S., 1938 (Univ. Sydney), Manly District Hospital, Manly.

Macindoe, Philip Hudson, M.B., B.S., 1935 (Univ. Sydney), 135, Boulevarde, Strathfield.

The undermentioned have been elected members of the Victorian Branch of the British Medical Association:

Leslie, Douglas Robert, M.B., B.S., 1937 (Univ. Melbourne), Royal Melbourne Hospital, Melbourne.

Crick, William Frederick Hamilton, M.B., B.S., 1936 (Univ. Melbourne), Children's Hospital, Carlton, N.3.

Reid, George, M.B., B.S., 1937 (Univ. Melbourne), Royal Melbourne Hospital, Melbourne.

Dobbin, Alexander Hamilton, L.R.C.P. and S. (Edinburgh), L.R.F.P.S. (Glasgow), 1935, Werribee.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on May 11, 1938, at the Children's Hospital, Carlton, DR. COLIN MACDONALD, the President, in the chair. The meeting took the form of a series of clinical demonstrations.

Multiple Congenital Deformities.

DR. WILFRED FORSTER showed a boy, aged two years, who had attended his clinic from the age of four months. The baby had presented multiple congenital deformities, comprising extreme bilateral *talipes equino-varus*, lateral mobility at the knee joints and flexion deformity at the hips, though the femoral heads were in the acetabula. The feet had resisted repeated attempts at reduction of the deformity, but the manipulations had resulted in bending of the tibiæ. Dr. Forster referred to the classification of *talipes equino-varus* into three groups: (*a*) ordinary *talipes equino-varus*; (*b*) *talipes equino-varus* associated with deformities of the tibia, such as absence of the lower portion; (*c*) *talipes equino-varus* of the rigid type, exemplified by the patient shown that night. The term *"arthrogryphosis multiplex congenita"* had been used for the syndrome which included rigid *talipes equino-varus*, flexion deformity at the knee joints and at the hip joints and usually similar rigidity of the joints of the upper limbs. In the case of the boy shown by Dr. Forster, the upper limbs were relatively normal and the mobility at the knee joints was noteworthy. There was a boy at the Frankston Orthopædic Branch of the Children's Hospital with a comparable grouping of congenital anomalies upon whom Dr. D. O. Brown had operated, performing arthrodesis of the knee joints and some plastic operations on the ankle joints. During Dr. Brown's absence abroad the boy was in the care of Dr. Forster, who was satisfied that the operations had been justified by the improvement in the boy's power of locomotion. As Dr. Macdonald had expressed his interest in the skiagrams of the feet and legs of the little boy shown at the meeting, Dr. Forster hoped that he would comment on them, and invited other members to discuss the advisability of early operation to overcome the deformities.

DR. H. DOUGLAS STEPHENS said that he could recollect three somewhat similar instances. One of the patients he had seen in consultation only. In another case the upper extremities had been affected, and the lower limbs were very like those of the boy shown by Dr. Forster. There was fixed ankylosis of each ankle in the position of *equino-varus*, accompanied by abnormal lateral movements at the knee joints; and Dr. Stephens had been unable to feel either of the patellæ. The girl's father had died of pernicious anæmia and her mother had the condition known as leucoderma; the sera of both mother and child had failed to react to the Wassermann test. Dr. Stephens added that the girl was now approximately seventeen years of age; and though her wrists and hands were very stiff, she was able to work badges on the pockets of athletic garments, and was highly intelligent. He had also noted her peculiar facial appearance, chiefly due to the very small size of her mouth. The third patient referred to by Dr. Stephens had been in his care at the Children's Hospital and had left the ward two months before the meeting. The anomalies were similar to those of Dr. Forster's patient, but deflection amounting to knock-knee had been present in one leg and to a minor degree in the other. The patient's blood serum had failed to react to the Wassermann test, and Dr. Stephens had not yet operated on the knee joints.

DR. BRYAN KEON-COHEN said that he queried the statement that in the type of case under discussion the deformity at the ankle joints was immovable. He remembered a baby who had come under treatment when only two hours old. The feet were amenable to manipulation, and when the baby was twelve months of age they were in good position; the hands of the patient had also "come out" readily.

DR. J. B. COLQUHOUN said that he too was interested in the condition; he had seen Dr. Brown's patient at Frankston running about like a monkey on hands and knees. He had had a rather regrettable experience with a patient himself. The patient had had both knees flexed almost at right angles, both feet being in rigid *equino-varus*; he also had congenital dislocation of a hip joint. Dr. Colquhoun reduced the congenital dislocation of the hip joint and put the limbs in plaster, in a position cal-

culated to keep the head of the femur in the right place. While the patient was temporarily out of his charge a femur and a tibia had been fractured on account of the flexion deformity at the knee joints; the head of the femur had come out of position. Despite treatment he had failed to make any impression on the deformity of the feet. Dr. Colquhoun commented on the peculiar shiny appearance of the skin of the patient, and expressed the opinion that the bony changes were ascribable to relative disuse. He considered it possible that the mobility at the knee joints might be diminished by the trauma of manipulation.

DR. E. E. PRICE drew attention to the differences of opinion as to prognosis which existed among authorities, and to Brockman's reference to the undifferentiated condition of soft mesoblastic tissue underlying the anomalies. He also mentioned the patient he had seen recently with *spina bifida*; the legs had been in a state of rigid deformity of a type similar to that under discussion, and it had crossed his mind that the two conditions were coincidental and not in the relation of cause and effect.

DR. W. KENT HUGHES said that he would like to know more about the shape and arrangement of the tarsal bones before making any suggestions to Dr. Forster concerning the treatment that should be adopted. As the tarsal bones were not likely to be properly differentiated yet, he thought Dr. Forster should wait a while before operating; the boy was always likely to be somewhat unstable in gait.

Dr. Colin Macdonald said that the condition of *arthrogryphosis multiplex congenita* might be described as congenital multiple fibrous ankylosis of joints of the upper and lower limbs. Owing to the mobility of the knees in Dr. Forster's patient the condition could scarcely be included amongst the "arthrogryphs". Dr. Macdonald also pointed out osteochondritic changes around the junction of the metaphysis and epiphysis in the skiagrams, together with a widening of the interspace between them. He said that he was in the habit of thinking of syphilis, scurvy, rickets and lead poisoning, in that order, as the cause of such changes; but in the present case he thought he could exclude all of those causes by consideration of the appearances in the skiagrams. They resembled nothing he had come across hitherto. It might be of interest to obtain information concerning the calcium and phosphorus content of the blood.

(To be continued.)

National Health Insurance.

FEDERAL NATIONAL HEALTH INSURANCE COMMITTEE.

THE inaugural meeting of the Federal National Health Insurance Committee was held at the Medical Society Hall, Albert Street, East Melbourne, on June 30, 1938, Sir Henry Newland, the President, in the chair.

Objects of the Committee.

This committee, which was constituted by the Federal Council of the British Medical Association in Australia at its meeting on June 30, 1938, will deal with all matters relating to national health insurance, the Federal Executive having ceased to function in such matters.

Names of Members Attending the Meeting.

The following members were present:

New South Wales: Dr. G. Bell, Dr. H. R. Grieve, Dr. W. F. Simmons.
Queensland: Dr. D. G. Croll, Dr. M. Patterson, Dr. T. A. Price.
South Australia: Sir Henry Newland, Dr. F. St. J. Poole, Dr. A. F. Stokes.
Tasmania: Dr. W. L. Crowther, Dr. S. Gibson, Dr. J. R. Robertson.
Victoria: Dr. F. L. Davies, Dr. D. Embelton, Dr. J. Newman Morris.
Western Australia: Dr. K. Aberdeen, Dr. F. W. Carter, Dr. L. A. Hayward.

Powers and Duties of the Committee.

It was resolved:

That the committee requests the Federal Council to take no action with regard to national health insurance outside the scope of the committee's resolutions without first consulting the committee.

Coopted Members.

It was resolved:

That Dr. J. H. Gowland (Victoria) be coopted a member of the committee.

Constitutional Legality of the National Health and Pensions Insurance Act.

It was resolved:

1. That consideration be given by the Federal Council to taking legal advice regarding the feasibility of applying to the High Court for an injunction to restrain the Government from implementing medical benefits pending a final decision on the constitutional aspects involved.

3. That no action be taken until legal opinion be obtained.

3. That, as the Victorian Branch has already done so and the New South Wales Branch proposes to do likewise, the South Australian Branch be requested to obtain legal opinion on the constitutional aspects involved.

Appointment of the Royal Commission.

It was resolved:

1. That the Commonwealth Government be requested to include within the terms of reference of the Royal Commission the consideration of a general medical service for the nation.

2. That the Commonwealth Government be also requested to include within the terms of reference of the Royal Commission an inquiry into the relationship that the capitation fee should bear to the income of the insured person.

3. That the resolutions be conveyed to the Prime Minister by telegram and also by telephone.

4. That the Royal Commission, having been set up by the Government as a court of inquiry and not as a tribunal agreed on by all parties, the members of the British Medical Association in Australia, while willing to present evidence, will hold themselves ready to accept the findings provided only that the findings will ensure an efficient medical service to the public and satisfactory conditions of service to themselves.

Preparation of the Profession's Case for Submission to the Royal Commission.

Questionnaire to Members.

It was resolved:

1. That a common *questionnaire* accompanied by a detailed list of instructions as to how the *questionnaire* should be answered, be prepared by this committee and sent out to every member of the Association in Australia, and that the draft *questionnaire* of the New South Wales Branch be used as a basis for discussion.

2. That the draft *questionnaire* be considered item by item.

3. That counsel's opinion be obtained as to the admissibility of *questionnaire* replies numbered against a key; and that if his opinion is that they

are admissible, then that the *questionnaires* be sent out numbered; but, if inadmissible, that the *questionnaire* be sent out with a detachable slip for signature.

4. That legal opinion be obtained forthwith.

5. That the *questionnaire* be issued in the form agreed upon.

6. That the *questionnaires* be sent to Branch secretaries and that each Branch arrange a key number of its members.

7. That the *questionnaires* on return to Branch secretaries be analysed on a plan laid down by the Federal organization and then returned, with the key, to the general secretary.

8. That the *questionnaires* be returnable on July 21, 1938.

Loss of Private Practice.

It was resolved:

That a further *questionnaire* (see Appendix) be sent to members and that such *questionnaire* be returnable on August 21, 1938.

General Preparation and Presentation of the Profession's Case.

It was resolved:

1. (*a*) That replies to *questionnaires* be classified by the National Health Insurance Committee in each State.

(*b*) That accepted replies be then transmitted through the General Secretary, Federal Council, to the actuary and economist.

(*c*) That the data thus obtained, along with the material supplied by the State insurance committees, be made available to counsel for consideration and formulation into a case to be presented to the commission.

(*d*) That the case thus formulated by counsel be considered by this committee.

(*e*) That each State insurance committee notify the General Secretary, Federal Council, of their views on the case to be presented.

(*f*) That where the term "State insurance committee" is used and a State insurance committee has not been appointed, the term shall include the State council.

(*g*) That each State insurance committee should meet at an early date to select a panel of two city and two country practitioners to be trained as witnesses for presentation of the profession's case.

2. That two special representatives of this committee be appointed to organize a common case in each State.

3. That Dr. T. A. Price and Dr. D. Embelton be the representatives.

Legal Representation.

It was resolved:

That it be a recommendation to the Federal Council that it avail itself of the services of Mr. N. Cowper as solicitor and Mr. L. Abrahams and Mr. A. C. Gain as counsel, and such other legal advisers as may be deemed necessary for appearance before the Royal Commission and matters pertaining thereto on behalf of the British Medical Association.

Cost.

It was resolved:

1. That a national health emergency fund be established and that contributions be collected by Branch councils and that 50% of such contributions be paid into the Federal fund, and that the purpose for which the fund shall be established shall be to meet the expenses of the preparation and presentation of the profession's case to the Royal Commission and for such other purposes as the Federal Council may from time to time determine.

2. That it be a suggestion to the National Health Insurance Committee of each Branch that an amount of ten guineas be asked of members of the Association as a first contribution.

National Insurance Departmental Medical Officers: Conditions of Service.

A communication from the Victorian Branch relative to the conditions of service of medical officers was read. It was resolved:

1. That the communication of the Victorian Branch be received.

2. That the recommendation in the communication of the Victorian Branch be approved and adopted, and that the appropriate authority, namely, National Insurance Commission, be supplied with a statement that, if and when a satisfactory scheme of service is arrived at, these are the terms which this committee recommends.

3. That the National Insurance Commission be further advised that, to get suitable medical practitioners for the positions, adequate salaries are necessary.

Organization of the Profession.

A communication was received from the Queensland Branch enclosing a recommendation that had been made to the Council of the Branch by a meeting of general practitioners, that a pledge be obtained from all members.

It was resolved:

That the request for a pledge from all members be not acceded to.

Publicity.

It was resolved:

1. That the resolutions passed at the meeting be published in THE MEDICAL JOURNAL OF AUSTRALIA.

2. That the present publicity committee be the vehicle for publicity for this committee.

Post-Graduate Work.

THE PRINCE HENRY HOSPITAL MEDICAL AND SURGICAL FELLOWSHIPS.

FOUR fellowships have been founded by the Board of Directors of the Prince Henry Hospital, Sydney, with the object of promoting post-graduate teaching in medicine and surgery in New South Wales, and also of encouraging and advancing research by systematized post-graduate instruction.

The fellowships will be known as the Prince Henry Hospital Medical Fellowships and the Prince Henry Hospital Surgical Fellowships, and there will be a senior and a junior fellowship in both medicine and surgery. Each fellowship will be tenable for one year. Successful applicants will reside at the Prince Henry Hospital and be attached to the medical and surgical units. They shall carry out such work and teaching as may be laid down by the directors of these units. Board and residence will be provided free of charge. The value of the senior fellowships shall be £400 and of the junior fellowships £300.

The Fellows will be chosen from men contemplating higher degrees, or may be selected for their promise of aptitude for the investigation of medical problems. In the granting of senior fellowships preference will be given to those who have held junior fellowships, particularly

those who have continued their studies abroad after graduation, or who have obtained a higher degree or diploma in Australia.

It is expected that the first fellowships will be granted towards the end of August, 1938.

Correspondence.

NATIONAL HEALTH INSURANCE.

SIR: A great number of critical remarks are being made about the manner in which the several Branch councils have handled the matter of national health insurance, and, too, recriminations have been made against the bulk of general practitioners for its apathy towards the elections of the councils. In my opinion these criticisms give support to the views put forward by Dr. E. P. Dark in his letter published in the issue of May 28, namely, that the direct representation of country members on the councils should be made possible. If this is done I can see no necessity for the formation of a new association to guard the interests of insurance practitioners, as has been suggested in several quarters. In New South Wales at least members cannot fail to appreciate the efforts made on their behalf by their Federal representatives.

We have been informed by the lay Press that a Royal Commission is to inquire into the justice of our claims for a higher capitation fee and other modifications to the proposed terms of insurance contract. I have not seen, as yet, any official medical statement as to how members are to assist in preparing the necessary evidence, and suggest that a new *questionnaire* be drawn up by an accountant and sent to members. Many doctors took exception to the last *questionnaire* relating to incomes earned, because the forms were numbered, but I consider that the situation is now too serious to allow such objections to stop individuals from helping in whatever way possible.

In our fight for a fair deal from the Commonwealth Government the capitation fee and other matters in reference to payments for services rendered have been the main subjects of contention. The fact must not be lost sight of that it is just as important to fight for a good system of control by the board which will be set up to administer the scheme. It is truly frightening to think that we may have to submit to the harassing and petty tyranny of lay officials as experienced by the British panel doctor, the evidence of which is to be seen in the supplements to *The British Medical Journal*. Now is the time to act, not after the fun has started, and only with unity in our ranks can we achieve anything. With complete unity we can do as the trade unions do—refuse to take service under the scheme until our demands are granted. The Government has adopted a dictatorial attitude towards us, and a similar response from us is needed to obtain our rights.

In common with many other general practitioners, I search eagerly in each fresh copy of THE MEDICAL JOURNAL OF AUSTRALIA for official news of progress or developments on the national health insurance arena. Each time the reward of the search is disappointment, and I am forced to turn for news of what is happening to the lay Press and to a publication which is not the official mouthpiece of the British Medical Association, namely, *The General Practitioner*. Whether the fault lies with you, Mr. Editor, or with the offices of the State councils, I do not know, but I think it is time that the journal showed a more positive and vital interest in the problem at present causing perturbation in the minds of the majority of its readers.

Yours, etc.,

R. ERROL MAFFEY.

Singleton,
New South Wales,
June 27, 1938.

BABEL.

SIR: The medical profession is now having the experience that has for generations, perhaps millenniums, been the lot of the manual worker—that his work, his efficiency, his contentment and security count nothing beside the financial difficulties involved in securing his wage. All human values are subordinated to financial values.

The manual worker has been forced to resort to unions, strikes, riots, in spite of arbitration courts, in order to get a mere subsistence. The mental worker, carrying heavy responsibilities, the character of whose work demands some leisure, reasonable comfort, and a feeling of satisfaction in his work, if it is to be efficient, will have to do the same, unless he uses his mental powers to seek the causes of our manifold national ills.

As you show in your leader "Babel", the young receive an unfair deal from the old. Our daily papers show the economic and political troubles that afflict society—wars, threats of wars, strikes, threats of strikes, falling prices, rising prices, unemployment or rearmament, power politics in general—evils from which no nation is exempt. Our own profession is threatened with slavery through the National Insurance Bill.

Why are things thus, in spite of the kindliness and good intentions of most individuals? Surely it is because we employ a vicious system of exchange. We have not learned how to make a fair exchange between all the classes of labourers—between the static workers who keep things going (preponderantly women and children), the productive workers (the craftsman and the grower), and the mass-productive worker (the machinist).

The only possible way in which such different classes of workers, of both sexes, of all ages, of great and of little talent, can effect a fair exchange is by exchanging work for work; instead of which we exchange things for things, so depriving the consumptive worker (such as women, children and others, including doctors) of their fair share of the production of the community.

If "medicos" are satisfied merely to sit back and grumble, instead of doing the fundamental thinking necessary to the salvation of the nation, they and others will be enslaved, and the whole development of Australia set back from what it might be.

Should doctors learn and teach the true way of life—observing the two great commandments and practising a family mode of life, the exchange of work for work—they will release not only themselves, but whole nations to the practice of fraternity within and without the nation—an impossibility under our existing money.

Australia has made its medium of exchange a pure legal tender (1933); it has now only to define it in terms of work and time to secure liberty and justice to all.

Yours, etc.,

MARY C. DE GARIS.

Geelong,
Victoria.
June 25, 1938.

Obituary.

WILLIAM COLIN MACKENZIE.

WE regret to announce the death of Professor Sir William Colin MacKenzie, which occurred on June 29, 1938, at Melbourne, Victoria.

ERNEST SANDFORD JACKSON.

WE regret to announce the death of Dr. Ernest Sandford Jackson, which occurred on June 29, 1938, at Brisbane, Queensland.

HAROLD STRATHFIELD RICH.

WE regret to announce the death of Dr. Harold Strathfield Rich, which occurred on June 23, 1938, at London, England.

Proceedings of the Australian Medical Boards.

TASMANIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act*, 1918, of Tasmania, as duly qualified medical practitioners:

Beattie, George Riddell, M.B., B.S., 1931 (Univ. Sydney), Port Arthur.
MacKenzie, Kenneth MacIver, M.B., Ch.B., 1937 (Glasgow), Royal Hobart Hospital, Hobart.

WARNING NOTICE.

BEFORE committing themselves to the purchase of an encyclopædia now being offered, members of the Victorian Branch are advised to communicate with the Medical Secretary of the Branch.

Diary for the Month.

JULY 12.—New South Wales Branch, B.M.A.: Organization and Science Committee.
JULY 19.—New South Wales Branch, B.M.A.: Ethics Committee.
JULY 20.—Western Australian Branch, B.M.A.: Branch.
JULY 21.—New South Wales Branch, B.M.A.: Clinical Meeting.
JULY 22.—Queensland Branch, B.M.A.: Council.
JULY 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JULY 27.—Victorian Branch, B.M.A.: Council.
JULY 28.—South Australian Branch, B.M.A.: Branch.
JULY 28.—New South Wales Branch, B.M.A.: Branch.
AUG. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 3.—Western Australian Branch, B.M.A.: Council.
AUG. 3.—Victorian Branch, B.M.A.: Branch.
AUG. 4.—South Australian Branch, B.M.A.: Council.
AUG. 5.—Queensland Branch, B.M.A.: Branch.
AUG. 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xviii to xxi.

ARAMAC HOSPITAL, ARAMAC, QUEENSLAND: Medical Officer.
AUSTIN HOSPITAL FOR CANCER AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Honorary Physician.
BRISBANE AND SOUTH COAST HOSPITALS BOARD, QUEENSLAND: Medical Officers.
COLLARENEBRI DISTRICT HOSPITAL, COLLARENEBRI, NEW SOUTH WALES: Medical Officer.
DEPARTMENT OF PUBLIC HEALTH, PERTH, WESTERN AUSTRALIA: Medical Officer.
DIRECTOR-GENERAL OF PUBLIC HEALTH, SYDNEY, NEW SOUTH WALES: Honorary Urologist.
ROYAL PRINCE ALFRED HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Officers.
ST. GEORGE DISTRICT HOSPITAL, KOGARAH, NEW SOUTH WALES: Deputy Medical Superintendent, Junior Resident Medical Officer.
THE PRINCE HENRY HOSPITAL, SYDNEY, NEW SOUTH WALES: Medical and Surgical Fellowships.
THE RACHEL FORSTER HOSPITAL FOR WOMEN AND CHILDREN, SYDNEY, NEW SOUTH WALES: Medical Officers.
THE UNIVERSITY OF MELBOURNE, VICTORIA: Chair of Physiology.
WILLIAMSTOWN, FOOTSCRAY AND DISTRICT GENERAL HOSPITAL, WILLIAMSTOWN, VICTORIA: Radiologist.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

Editorial Notices.

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